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ART. XII. SCOLECODONTS FROM THE TRENTON SERIES
(ORDOVICIAN) OF ONTARIO, QUEBEC, AND NEW YORK

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(PLATES I-VII)

INTRODUCTION

The Trenton rocks of North America have been studied for more than one hundred years, yet very little detailed and conclusive information is available in the literature. There seems to be little agreement among geologists in regard to Trenton stratigraphy. It would appear that several years of detailed field and laboratory work may be necessary to clear up the many disagreements. Since everything seems not to be right with Trenton stratigraphy, the writer will only attempt to describe the scolecodont fauna. The scolecodonts, fossil polychæte annelid jaws, are very plentiful in Trenton rocks, often outnumbering other fossil specimens. In this paper 122 species are considered, of which 115 are described as new. The Rockland formation contains by far the greater number of species. It is probable that many of the 72 species limited to the Rockland will be found in formations of the Black River group when they are studied. This may be especially true in the Ottawa valley where there seems to be almost continuous deposition. A number of species occurring in the Rockland and Cobourg were found in the Collingwood and Gloucester formations.

Collections were made from Trenton outcrops from Georgian Bay to Prince Edward County, Ontario; from northern New York; and from the vicinity of Ottawa, Ontario, to Paquette Rapids, Quebec. From each locality about 25 to 50 pounds of limestone were collected along the face of the outcrop for examination. Only rarely were scolecodonts noted on the surface of the rocks. The type of matrix does not seem to be indicative of the presence or absence of scolecodonts. It has been observed often that rocks containing few or no other kinds of fossils are apt to contain scolecodonts. The limestone from every locality dissolved readily in weak acid leaving an insoluble residue that was examined for specimens. Often a piece of limestone the size of one's fist will contain from two to three hundred specimens while from another layer or locality only a few, or none at all, may be present. In addition to the scolecodonts many other interesting fossils and minerals are often found.



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When, at a locality, several score of feet of a formation are exposed, both vertically and horizontally, it may be easily understood that the chances of missing a layer that might contain scolecodonts are considerable. Therefore, the faunal lists for the particular localities which are given subsequently may form far from the true picture. If more material was examined from each outcrop it is probable that many more species, including new ones, would be found. From these lists of fossils obtained it will be noted that the scolecodont fauna was largely collected at the Ontario and Quebec localities. This is true of the number of specimens as well as species.

The classification of the beds of the various localities is only tentative and is based partly on the scolecodont fauna, a study of the literature, and from communications and conversations with various geologists familiar with the Trenton rocks.

The localities listed below are only a few of a large number at which collections were made. The length of time needed to examine the residues from a particular locality makes it impossible to include as many as might be desired.

It has given me a great deal of pleasure to name the many species of these worms after my various friends, colleagues, and critics in the Carnegie Museum.

The holotypes of the species described in this paper and a large series of duplicate specimens are in the Carnegie Museum; the paratypes and a number of duplicate specimens have been divided between the Royal Ontario Museum of Paleontology and Princeton University.

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ENUMERATION OF THE FAUNA AT SELECTED LOCALITIES

Belleville, Ontario

In the vicinity of Belleville a number of quarries expose the Hull (?) limestone. Not many scolecodonts were found but the following species were taken from the residues: *Ildraites camurus*, *Leodicites biformis*, *L.? continuus*, *Marleneites farrari*, *Paleænonites dillae*, *Staurocephalites cuneiformis*, and *S. triplus*.

Cobourg, Ontario

A considerable number of specimens were found at Cobourg, the type locality for the Cobourg limestone. However, all species found in these rocks were also common in the Rockland. The following species were identified: *Eunicites sweadneri*, *E. tolmachoffi*, *Ildraites rarus*, *Lumbriconereites deflexus*, *L. linki*, *Ænonites fissilis*, and *Paleænonites dillae*.

Collingwood, Ontario

No attempt was made to separate the upper and lower Cobourg limestone at this locality. Scolecodonts are very common and the jaws may be seen on the surface of the rocks at any outcrop. Collections were made along the Pretty River in the east end of Collingwood at Georgian Bay, in a large quarry in the east end of Collingwood, and in an abandoned quarry in the west end of the town. The limestone is thin-bedded, except in the large quarry, rubbly, argillaceous and weather gray. Of the following thirty-six species only six are limited to this formation: *Arabellites ? doutti*, *A. rectidens* Eller, *Eunicites sweadneri*, *E. tolmachoffi*, *Ildraites camurus*, *Leodicites angulus*, *L. arquatus*, *L. bisulcus*, *L. breviculus*, *L. buris*, *L. exilis*, *Lumbriconereites bicornis*, *L. concertatorius*, *L. copiosus*, *L. crassus*, *L. deflexus*, *L. johnsoni*, *L. kosinskii*, *L. langae*, *L. linki*, *L. longæ*, *Marleneites arduus*, *Marphysites aptus*, *Nereidavus alatus*, *N. avinoffi*, *N. procurvus ?*, *Ænonites adversus*, *Æ. coggeshalli*, *Paleænonites comptus*, *P. frickei*, *P. dillae*, *Staurocephalites absis*, *S. admirabilis*, *S. ? arcus*, *S. heppenstallae*, and *S. nettingi*.

Dalrymple, Ontario

A little more than a mile south of Dalrymple the highway drops over a low escarpment. Limestone crops out for about a half-mile along this road. There has been some discussion about this limestone but it is probably Trenton. Johnson (1911) describes beds thirty-five feet thick, south of Dalrymple as Leray, now known as Coboconk from Central Ontario. Kay (1942) refers it to the Rockland. At Coboconk, about fifteen miles east of Dalrymple, a sub-lithographic limestone, Gull River of Okulitch (1939), is succeeded by twelve feet of Moore Hill and twenty-one feet of Coboconk limestone to the top of the exposure in the quarry. Kay (1937) places the Moore Hill as Chaumont, Black River, and the Coboconk as Napanee-Rockland. Okulitch (1939) however states that the Coboconk should remain in the Black River. Kay based his conclusions on the fauna

which he found quite like the type Napanee. A number of specimens were found at this locality and the following species were identified: *Arabellites* ? *doutti*, *Leodicites arquatus*, *Lumbriconereites assimilis*, *Ænonites* ? *intrinsecus* and *Staurocephalites nettingi*. Two of these species are limited to the Rockland and the others extend from Rockland through Cobourg.

Downeyville, Ontario

East of Lindsay and about two miles north of Downeyville the highway cuts an outcrop of the Rockland formation. A number of scolecodont specimens were found at this locality including the following species: *Ildraites camurus*, *Lumbriconereites linki*, *L. tuberosus*, and *Staurocephalites nettingi*.

Gamebridge, Ontario

A large number of scolecodonts were found in the material from a small quarry on lot 13, concession A, Mara township. The quarry is now filled with water but it is said to be about thirty-two feet deep. The limestone is probably Rockland in age and the following scolecodont species were found: *Eunicites acus*, *E. toddi*, *Leodicites anticus*, *L. artus*, *L. creditensis* ? *Lumbriconereites curvus*, *L. deflexus*, *L. projectus*, *L. triquetrus*, *Nereidavus alatus*, *N. avinoffi*, *N. procurvus* ?, and *Staurocephalites nettingi*.

Kirkfield, Ontario

The quarry at Liftlock, near Kirkfield, contains a large fauna of scolecodonts. Of the thirty-six species identified, fourteen are limited to the Rockland, two to Rockland-Sherman Fall, and the remainder extend from Rockland through Cobourg. Kay (1937) lists a contact of the Hull and Sherman Fall in this quarry. Later Kay (1943), at the suggestion of G. Winston Sinclair, changed the Hull to Kirkfield, since Kirkfield, Johnson (1911), has precedence over Hull, Raymond (1914). Sinclair (1942) considers the Kirkfield beds to be contemporaneous with the Rockland formation. No difference in the scolecodont fauna was noted between the upper and lower beds in the quarry. The scolecodonts are as follows: *Arabellites* ? *doutti*, *A. rectidens* Eller, *Eunicites barbaricus*, *E. cavus*, *E. coniectus*, *E. kirkfieldensis*, *E. sweadneri*, *Ildraites camurus*, *I. fuehreri*, *Leodicites antefixus*, *L. artus*, *L. creditensis* Eller ?, *Lumbriconereites angustifossus*, *L. assimilis*, *L. copiosus*, *L. deflexus*, *L. jenningsi*, *L. johnsoni*, *L. linki*, *L. longae*, *L. projectus*, *Nereidavus alatus*, *N. avinoffi*, *N. procurvus* ? Eller, *Ænonites bidwelli*, *Æ. dubius*, *Æ. fissilis*, *Paleænonites*

accuratus ? Eller, *P. acutus*, *P. castigatus*, *P. clinatus*, *P. pennatus*, *Staurocephalites admirabilis*, *S. agriodos*, *S. appositus*, and *S. nettingi*.

Lakefield, Ontario

The abandoned quarry of the Canada Cement Company at Lakefield contained a large number of scolecodonts. Kay (1937) lists Hull and Sherman Falls for this locality. The scolecodont species appear, however, to be mostly Rockland and the following were identified: *Arabellites* ? *claytonae*, *A.* ? *doutti*, *Eunicites cavus*, *E. compressus*, *E. tolmachoffi*, *Leodicites agostini*, *L. angulus*, *L. artus*, *L. breviculus*, *L. brooksi*, *L. clementi*, *L. creditensis*, *L. semiquadratus*, *Lumbriconereites bicornis*, *L. concertatorius*, *L. crassus*, *L. johnsoni*, *L. linki*, *L. projectus*, *Marphysaites aptus*, *Nereidavus alatus*, *N. angulosus*, *N. procurvus*, *Paleænonites accuratus* ? *P. acutus*, *P. dillae*, *P. henryi*, *Staurocephalites absimilis*, *S.* ? *arcus*, *S. heppenstallae*, *S. miorowae*, *S. nettingi*, *Ungulites bifurcus*, and *U. sumnerae*.

Lindsay, Ontario

Three miles north of Lindsay, highway number 35 is cut through the escarpment and exposes about twelve feet of thick to thin-bedded limestone. Scolecodonts were noted on the surface of the rocks and the following species which are mostly Rockland were collected: *Eunicites cavus*, *E. toddi*, *E. twomeyi*, *E. whiteae*, *Ildraites camurus*, *I. fuehreri*, *I. rarus*, *Leodicites arquatus*, *L. biformis*, *L. breviculus*, *L. brooksi*, *L. clementi*, *L. conwallis*, *Lumbriconereites assimilis*, *L. johnsoni*, *L. linki*, *L. projectus*, *L. tuberosus*, *Marleneites arduus*, *Nereidavus angulosus*, *N. avinoffi*, *N. procurvus*, *Ænonites coggeshalli*, *Æ. fissilis*, *Paleænonites accuratus* ? *P. acutus*, *P. castigatus*, *P. circumscriptus*, *P. davisae*, *P. dillae*, *P. henryi*, *P. pennatus*, *Staurocephalites mcallae*, and *Ungulites longidentatus*.

Millington, Ontario

A small, shallow, limestone quarry, which was opened for road mettle, is located southeast of Orillia along the highway. It is now, however, filled with water from a large spring and only the top foot of limestone is exposed. A number of scolecodonts were noted on the surface of the rocks scattered near the stone crusher. The limestone is considered to be Rockland. The following species were identified from this locality: *Ænonites coggeshalli*, *Æ. bittingsae*, *Staurocephalites aduncus*, *S. heppenstallae*, and *S. nettingi*.

Napanee, Ontario

On Selby Creek, about one and one-half miles north of Napanee, Trenton rocks of Rockland age are exposed. Kay (1937) divided the Rockland into two members, the Selby and the Napanee, and used this locality as the type section. Samples of the limestone were taken from each of these two divisions but scolecodonts were found only in the Napanee. This does not mean that the exposed four feet of Selby contain no scolecodonts. Another sampling of the member might contain a number of specimens. The upper beds at this locality contained the following species: *Leodicites clementi*, *Lumbriconereites irregularis*, and *Ænonites bidwelli*.

Peterborough, Ontario

About four miles north of Peterborough a small quarry has been opened near the highway for road material. A few scolecodonts were observed on the surface of the limestone. The residues, after dissolving the limestone in acid, contained a medium number of specimens and the following species were identified: *Eunicites plackae*, *Lumbriconereites assimilis*, *L. linki*, *Marleneites millerae*, *Nereidavus alatus*, *Paleænonites circumscriptus*, and *Staurocephalites kayi*. A Rockland age for the limestone is indicated by the above scolecodonts.

Port Hope, Ontario

The Cobourg limestone outcrops along the small stream that runs through the center of Port Hope. It is a thin-bedded limestone with considerable shale partings. At the north end of the town, near the dam site of the old "hydro" company, the limestone again crops out. This is more than a mile upstream from the outcrops in the center or eastern end of the town. Although there is a slight southernly dip of the strata it is possible that the total thickness of the Cobourg at Port Hope is greater than has been reported. The following species were found: *Arabellites rectidens* ? Eller, *Ænonites impardentatus*, and *Paleænonites dillae*.

Hull, Quebec

A large number of specimens were found in the limestone residues of the Hull formation from the quarries at Hull. Only three species were identified and they are common to the Rockland and Cobourg: *Diopatraites* sp., *Lumbriconereites linki*, *Staurocephalites heppenstallae*, and *S. nettingi*. From the Philemon Island, Ottawa River at Hull, *Diopatraites* sp., and *Ildraites rarus* were recorded.

Paquette Rapids, Ottawa River, Quebec

The collections in the Carnegie Museum from Paquette Rapids, just north east of Allumette Island, are labeled "Black River." In the literature the age of the limestone at this locality has been given as Leray, Black River, and Trenton. Kay (1937) found the fauna to be equivalent to the Cloche Island limestone of the Rockland formation. Scolecodonts were found to be common at Paquette Rapids and twenty-five species were identified, eighteen of which are attributed only to the Rockland. The following scolecodonts were found: *Diopatraites fustis*, *Eunicites barbaricus*, *E. tolmachoffi*, *E. planoconvexus*, *E. toddi*, *E. whiteae*, *Leodicites corbis*, *L. collatatus*, *L. convallis*, *Lumbriconereites linki*, *L. projectus*, *L. langae*, *Marleneites arduus*, *M. aureus*, *Ænonites coggeshalli*, *Æ. bidwelli*, *Orthopelta ? femoralis*, *O. ? bifidus*, *Paleænonites clinatus*, *Staurocephalites nettingi*, *S. mccallae*, *S. kayi*, *S. paquettensis*, *S. arcus*, and *Ungulites bifurcus ?*.

Three Rivers, Quebec

A small specimen of limestone from the St. Maurice quarry north of Three Rivers was dissolved in acid. This piece of limestone measured only three by two inches in size but more than 400 scolecodonts were recovered from the residue. It was made available through the kindness of Professor V. J. Okulitch. From among the specimens 52 species were identified and the following distribution was noted: 10 species were found only at this locality, 21 species were limited to the Rockland, 3 species extended into the Sherman Fall, and 18 species extended into the Cobourg. From the above data it is suggested that the Three Rivers locality is Rockland in age. Professor Okulitch, however, found at least one specimen of *Rafinesquina deltoidea* from this locality which usually suggests fairly high Trenton. The following scolecodonts were recorded: *Arabellites ? doulti*, *Diopatraites tricusps*, *Eunicites aculeus*, *E. acus*, *E. ansatus*, *E. cavus*, *E. colossus*, *E. compressus*, *E. geisacanthus*, *E. sweadneri*, *E. tolmachoffi*, *E. whiteae*, *Ildraites rarus*, *Leodicites angustisulcus*, *L. artus*, *L. biformis*, *L. breviculus*, *L. brooksi*, *L. clementi*, *L. convallis*, *L. semiquadratus*, *Lumbriconereites angustifossus*, *L. assimilis*, *L. dissimilis*, *L. kosinskii*, *L. linki*, *L. longae*, *L. okulitchi*, *L. projectus*, *L. tuberosus*, *Marleneites arduus*, *M. farrari*, *Nereidavus alatus*, *Ænonites coggeshalli*, *Æ. ? dubius*, *Paleænonites acutus*, *P. castigatus*, *P. circumscripatus*, *P. clinatus*, *P. davisae*, *P. dillae*, *Siluropelta calcaratus*, *Staurocephalites ? absimilis*, *S.*

appositus, *S. ? arcus*, *S. bijugus*, *S. kayi*, *S. mcallae*, *S. nettingi*, *Ungulites bifurcus*, *U. confertus*, and *U. sumnerae*.

Copenhagen, New York

The Hallowell member, Kay (1937), of the Cobourg is present in a quarry at Copenhagen. A few specimens were noted on the surface of the rocks and the following species were found in the residues after the limestone was dissolved in acid: *Eunicites tolmachoffi*, *Leodicites clementi*, and *Staurocephalites nettingi*.

Below High Falls and the power plant at Copenhagen, the Denmark member, Kay (1937), of the Sherman Fall was examined. Although no scolecodonts were found on the surface of the limestone the residues produced the following species: *Ildraites fuehreri*, which has wide distribution in the Rockland and Cobourg formations, *Lumbriconereites macmillani* and *Nereidavus artatus* found only at this locality, and *Paleænonites acutus* and *P. clinatus* which are limited to the Rockland.

Henderson, New York

The state highway (No. 3), in a road cut at a locality about one mile from Henderson and Henderson Harbor exposes the Sherman Fall. Only a few specimens were found and the following species were identified: *Arabellites rectidens* ? Eller, *Leodicites clementi*, and *Paleænonites dillae*.

Lowville, New York

Kay (1937) separates the Rockland at Lowville into the Selby and Napanee members. Scolecodonts were common in both members and no species was limited to either one. *Leodicites absolutus* and *Marleneites aureus* were found only at this locality. The following species found at Lowville have wide distribution: *Eunicites tolmachoffi*, *Ildraites camurus*, *Lumbriconereites assimilis*, *L. linki*, *Marleneites farrari*, *Staurocephalites cuneiformis*, *S. heppenstallae*, and *S. nettingi*.

Watertown, New York

About three miles south of Watertown, on the road to Rodman, the highway cuts the escarpment and exposes Trenton rocks. Seven species of scolecodonts were found at this locality. All forms, except a questionable one, have been found in both the Rockland and Cobourg formations: *Leodicites breviculus*, *Lumbriconereites deflexus*, *L. bicornis*, *L. projectus*, *L. linki*, *Nereidavus alatus*, and *Paleænonites accuratus* ? Eller.

DESCRIPTIONS OF SPECIES

Genus *Lumbriconereites*, Ehlers, 1868***Lumbriconereites linki* sp. nov.**

Maxilla I, plate I, figs. 1-3.

The jaw is elongate and not very wide. Measurements of the jaw range between 0.35 mm. and 1.02 mm. in length. Along the nearly straight inner margin a series of fourteen to sixteen blunt, conical denticles extends nearly to the posterior end. The fang is small and pointed and appears to be a continuation of the outer margin. Together with the fang, the first three denticles may point forward. The largest denticles are found at the mid-area and posteriorly they decrease gradually in size. A small indentation at about the mid-point on the outer margin forms a small, angular shank. The inner margin is gently rounded. A large fossa is present on the upper side. The margins of the fossa are slightly thickened and rounded. The under side is flattened and slightly concave adjacent to the denticles.

The straightness of the margin bearing the denticles and the shape of the shank differentiate this form from other related species.

Occurrence: The form is found throughout the Trenton and is widely distributed from Collingwood, Ontario, to Lowville, New York.

Type: Holotype in Carnegie Museum, number 25,285; a paratype in Princeton University Museum.

***Lumbriconereites concertatorius* sp. nov.**

Maxilla I, plate I, figs. 4-6.

The jaw is narrow and elongate. A series of fourteen sharp-pointed, conical, backward directed denticles extends the full length of the jaw. The denticles at the anterior part of the jaw are nearly in the same plane with the upper surface of the jaw, while the denticles at the posterior are oblique to the surface. The fang is large and pointed, but not hooked. The denticles are nearly uniform in size and become only slightly smaller at the posterior end. On the outer margin two small indentations form a small shank. A shallow fossa occupies about one-half of the jaw. The margins of the fossa are thickened and rounded except along the outer edge. The upper side of the jaw is curved while the under side is flattened. The type specimen measures 0.75 mm. in length.

This species seems to be half way between forms described under the genera *Enonites* and *Lumbriconereites*. A synopsis of its specific relationships will not be attempted at this time. When the form is viewed from the under side the bight and protuberance on the outer margin suggest that the species belongs under the genus *Lumbriconereites*. If the form is examined from the upper side the protuberance appears to be part of the fossa. The side view resembles many species of *Lumbriconereites*. However, when considered as a whole it has very few of the characteristics of a typical species of *Lumbriconereites*. Some of the figured specimens of *L. copiosus* Eller (1942) show a likeness in a general way to *L. concertatorius*.

Occurrence: The form is found in the Upper Cobourg at Collingwood, Ontario, and in the Rockland at Lakefield, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,308.

***Lumbriconereites curvus* sp. nov.**

Maxilla I, plate I, figs. 7, 8.

The jaw is small and measures 0.59 mm. in length. Along the curved inner margin a series of seventeen sharp-pointed, conical, backward directed denticles extends the full length of the jaw. The first denticle or fang is large, well hooked, and is not in alignment with the other denticles. The denticles are quite uniform in size and become smaller only at the posterior end. The outer margins are irregularly curved and form narrow but long flanges on both the sides. A long narrow fossa occupies about three-quarters of the length of the upper side of the jaw. The margins of the fossa are wide and flattened. The posterior end is acute. Both upper and under sides of the jaw are flattened.

Lumbriconereites proclivis Eller (1942) has a general resemblance to *L. curvus*. Two species described in this paper, *L. jenningsi* and *L. tuberosus* are similar to *L. curvus* in some details. Stauffer (1933) described several species under the genus *Protarabellites* that resemble *L. curvus*. Only the under surface of Stauffer's specimens are shown; thus a detailed comparison cannot be made. A relationship may be noted between *L. cooperi* Eller (1938), figures 1-4, and *L. curvus*.

Occurrence: The figured specimen is from the Rockland at Gamebridge, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,362.

***Lumbriconereites projectus* sp. nov.**

Maxilla I, plate I, figs. 9-11.

The jaw is narrow and elongate. Measurements of the jaw range between 0.59 mm. and 1.08 mm. in length. A series of thirteen to eighteen sharp, conical, backward directed denticles extends nearly to the posterior end. Most of the denticles are in an oblique position to the under surface of the jaw. The fang is not large and is followed by a small denticle. The remaining denticles are uniform in size nearly to the posterior end, where they become rapidly smaller. A large flange is present in the anterior end of the jaw. On the opposite, irregularly curved, margin a very small flange-like projection is found opposite the third denticle. A large fossa occupies most of the upper surface of the jaw. The margins of the fossa are thin and rounded, except near the small flange-like projection where it is thickened. The posterior end of the jaw is very narrow, due to a deep, crescent-shaped bight. The under surface of the jaw is flattened between the denticles and the flange.

L. cooperi Eller (1938), figures 7, 8, resembles *L. projectus* in a general way. The position of the shank is the same but the arrangement of the denticles is different. *L. cooperi*, figures 5, 6, differs from *L. projectus* and when more is known of the Devonian fauna, *L. cooperi*, figures 7, 8, should probably be considered as a different form. Stauffer (1933) described a form, *L. cameratus*, from the basal Platteville of Minnesota that is similar in its general shape to *L. projectus* but lacks the small shank-like projection on the margin.

Occurrence: *L. projectus* is common in the Rockland and was found from Lindsay, Ontario, to Watertown, New York.

Type: The holotype is in the Carnegie Museum, number 25,273; paratypes have been deposited in Princeton University Museum and the Royal Ontario Museum of Paleontology.

***Lumbriconereites crassus* sp. nov.**

Maxilla I, plate I, figs. 12, 13.

The jaw is thick, elongate and wide anteriorly. Specimens measure from 0.64 mm. to 1.08 mm. in length. Along the arched inner margin a series of large, triangular denticles extends about three-fourths the length of the jaw. The fang or first denticle is large, pointed, hooked and not in alignment with the other denticles. The second denticle is medium-sized

and the third is small. The denticles then become large but decrease in size posteriorly. A small, thick, angular shank is present on the outer margin in the posterior half of the jaw. The small bight adjacent to the shank forms with the rounded inner margin an acute posterior extremity. On the upper side of the jaw a small, shallow fossa is present. It occupies the posterior end of the jaw. The margins of the fossa are not thickened except adjacent to the denticles. Both the upper and under surfaces of the jaw are convex.

L. deflexus Eller (1942) resembles *L. crassus* in a general way but differs in the thickness of the jaw, the shape and character of the fossa and the number and position of the denticles.

Occurrence: The species is found in the Rockland at Lakefield, Ontario, and in the Cobourg at Collingwood, Ontario.

Types: Holotype in Carnegie Museum, number 25,304; a paratype in the Royal Ontario Museum of Paleontology.

***Lumbriconereites langae* sp. nov.**

Maxilla I, plate I, figs. 14,15.

The jaw is wide at the mid-area and tapers gradually to acute anterior and posterior extremities. The described specimen measures 1.13 mm. in length. A series of fourteen or fifteen small, conical, backward directed denticles extends the full length of the jaw. When a specimen is viewed from the under side, the three or four anterior denticles are directed to the left, the next few are about perpendicular to the surface, and the remaining posterior denticles point to the left. The fang is heavy, not hooked, and tapers rapidly to a point. The second denticle is quite large and may not point in a backward direction. The remaining denticles decrease gradually in size to the posterior end. In the posterior half of the jaw a small bight emphasizes the width of the jaw. The shank is small and its anterior margin is nearly straight to the fang. A shallow fossa occupies about half of the upper surface of the jaw. The margins of the fossa are rounded and thickened, especially the inner margin of the jaw. Except for the area adjacent to the denticles on the under side, both surfaces are, in general, convex.

There is a resemblance between *L. dubius* Stauffer (1933) and *L. langae*, especially in the character of the denticles. Other details differ slightly. Since only the under surface of Stauffer's species is shown a complete analysis cannot be made.

Occurrence: In an abandoned quarry, in the west end of Collingwood, Ontario, thin-bedded, rubbly Upper Cobourg limestone contained an abundance of these jaws.

Type: The holotype is in the Carnegie Museum, number 25,188.

***Lumbriconereites jenningsi* sp. nov.**

Maxilla I, plate I, figs. 16-18.

The jaw is elongate with irregular lateral margins. The figured specimen measures 0.45 mm. in length. A series of sixteen small, blunt denticles extends the full length of the jaw. The anterior denticles point in a forward direction while the posterior ones point backwards. The fang is long, sharp and somewhat hooked. When the jaw is viewed from the under side, it may be seen that the fang and the two following denticles are out of alignment with the other denticles. Most of the denticles are of uniform size. The outer margin is nearly straight to a small, rounded shank and continues from a very shallow bight to the blunt posterior end. A small rounded flange is also present on the inner margin. About two-thirds of the upper side is occupied by a shallow fossa. The inner and anterior margins of the fossa are thickened and rounded.

It is probable that this form is the left jaw of an asymmetrical right and left Maxilla I. Some species of *Ænonites* resemble this form. *L. proclivis* Eller (1942) is similar to *L. jenningsi*. The flanges on the lateral margins are alike but their positions differ. The arrangement of the denticles is similar but the shape, especially of the fang, is not the same. The fossa and the posterior extremity of the forms are quite different. There is slight resemblance between *L. cooperi* Eller (1938) and *L. jenningsi*.

Occurrence: The quarry at Liftlock near Kirkfield, Ontario, is considered to be Rockland for the present. A large number of jaws were found at this locality including the above described form.

Type: The holotype is in the Carnegie Museum, number 25,259.

***Lumbriconereites irregularis* sp. nov.**

Maxilla I, plate I, figs. 19-21.

The jaw is small, irregular in shape, and the described specimen is 0.38 mm. in length. Along the center of the under side a series of eight or nine small, sharp-pointed, backward directed denticles extends about three-quarters the length of the jaw. The fang is large and blunt. A second large denticle is present on the inner margin and is not in line

with the other denticles. There is a space between the fang and the regular series of denticles. On the outer margin a heavy shank is present and is only slightly emphasized by the shallow bight. The posterior of the jaw ends in an acute extremity. A shallow fossa occupies the posterior half of the jaw. The margins of the fossa are thickened and rounded. The upper and under sides of the jaw are convex except for some flattened areas.

Lumbriconereites irregularis resembles other species of the genus only in a general way.

Occurrence: About one and one-half miles north of Napanee, Ontario, on Selby Creek. Kay (1937) has divided the Rockland into the Selby and Napanee members; *L. irregularis* was found in the upper beds.

Type: The holotype is in the Carnegie Museum, number 25,200.

***Lumbriconereites macmillani* sp. nov.**

Maxilla I, plate I, figs. 22-24.

The jaw is small, suboval in outline and the figured specimen measures 0.27 mm. in length. A series of thirteen small, conical sharp pointed denticles extends nearly the full length of the jaw. The denticles point in a perpendicular direction to the inner margin and decrease slightly in size to the posterior end. The first denticle or fang is small, hooked, and not in alignment with the other denticles. A large, deep fossa occupies about two-thirds of the upper area of the jaw. The margins of the fossa are slightly thickened anteriorly and heavy and well rounded posteriorly. The upper and under surfaces of the jaw are highly convex.

Lumbriconereites macmillani is similar in a general way to several right jaws of the genus. It differs from them in its width, regularity of outline, and smoothness of surface features. If the form were not viewed from all sides it might be considered to belong to the genus *Ænonites*.

Occurrence: The figured specimen was collected at Copenhagen, New York, below High Falls and the power plant.

Type: The holotype is in the Carnegie Museum, number 25,211.

***Lumbriconereites johnsoni* sp. nov.**

Maxilla I, plate I, figs. 25, 26.

The jaw is wide, long, and measures from 0.83 mm. to 2.29 mm. in length. An average specimen measures about 1.5 mm. A series of thirteen to eighteen large, conical, backward directed denticles extends the com-

plete length of the jaw. The posterior denticles are oblique to the under surface. A fang, just slightly larger than the second denticle, is not in alignment with the series. The denticles are nearly uniform in size and become smaller only at the posterior end. A very wide and angular shank is present at the mid-area of the jaw. The crescent-shaped bight posterior to the shank is not deep. The opposite margin is gently rounded. The anterior region of the jaw is wide, while the posterior is narrowly truncate. A large, shallow fossa occupies about two-thirds the upper side of the jaw. The margins of the fossa are rounded but not thickened. The surfaces of the jaw are irregularly concave and convex.

Except for a general likeness, there is not sufficient similarity between other species and *Lumbriconereites johnsoni* to warrant comparisons.

Occurrence: The figured specimen is from the Rockland near Lindsay, Ontario, where it was very common. It was also found in the Cobourg.

Type: The holotype is in the Carnegie Museum, number 25,237. Paratypes are in the Royal Ontario Museum of Paleontology and Princeton University.

***Lumbriconereites triquetrus* sp. nov.**

Maxilla I, plate I, figs. 27, 28.

The jaw is long, very narrow, and measures 1.22 mm. in length. On the straight inner margin, a series of twenty-one sharp-pointed, backward directed, triangular denticles extends nearly the full length of the jaw. The first denticle or fang is large, conical, and straight. The second denticle is small, triangular, and points directly backwards. Following the five minute denticles are two small, broadly triangular, teeth that are perpendicular to the inner margin. The remaining denticles are larger and decrease in size gradually to the posterior end. A narrow fossa occupies about three-quarters the length of the jaw. The right margin of the fossa when viewed from the upper side is slightly thickened and rounded. The opposite margin is thin and probably broken. It is possible that a small flange was present at about the mid-area. The sides of the jaw are nearly parallel and the posterior end is blunt. If the jaw was observed in cross section it would have nearly the appearance of an isosceles triangle of which the sides would be concave.

Only one specimen of this form was found and probably it is broken. The character and arrangement of the denticles of *L. triquetrus* is similar to *L. copiosus* Eller (1942). Two species, *L. assimilis* and *L. bicornis* described in this paper have a general relationship to *L. triquetrus*. Except

for the denticles, certain specimens of *L. scrobiculus* Eller (1944), figs. 3, 4, are similar to *L. triquetrus*.

Occurrence: The figured specimen is from the Rockland at Gamebridge, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,361.

***Lumbriconereites bicornis* sp. nov.**

Maxilla I, plate I, figs. 29, 30.

The jaw is large, elongate, and measures from 0.89 to 1.29 mm. in length. A series of twenty-one short, angular denticles extends the full length of the slightly arched inner margin. The first and second denticles are very large and hooked. The remaining denticles are small but increase in size to the mid-area and then become smaller to the posterior end. All the denticles are slightly oblique to the under side. A narrow curved fossa occupies about two-thirds of the upper side of the jaw. The left margin of the fossa when observed from the upper side is only slightly thickened while the right margin is wide and rounded. The jaw is widest at the mid-point and the posterior end is obliquely truncate. Both upper and under sides of the jaw are irregularly convex and concave. The area adjacent to the denticles is especially flattened or concave.

The wide posterior end is not common for species of *Lumbriconereites*. There is a general likeness between *L. cooperi* Eller (1938) and *L. bicornis*. The posterior end and the shape and size of the fossa are not the same. *L. scrobiculus* Eller (1945) has a truncate posterior end similar to *L. bicornis* but the fossa and denticles are different. There is a very slight relationship between *L. tuberosus* and *L. bicornis*.

Occurrence: The form was found at Watertown, New York, Lakefield, Ontario, and in the Cobourg at Collingwood, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,359.

***Lumbriconereites longae* sp. nov.**

Maxilla I, plate I, figs. 31-33.

The jaw is elongate and narrow, anteriorly and posteriorly. Specimens measure from 0.75 mm. to 1.80 mm. in length. A series of eleven to fourteen sharp, conical, backward directed denticles extends nearly the full length of the jaw. The fang is large but not well hooked. The second or third denticle is often minute. The remainder of the denticles increase in size to the mid-area and then decrease gradually to the posterior end.

The outer margin curves outward from the posterior and anterior ends to form an angular shank in the posterior half of the jaw. A shallow fossa is present in the posterior area. The margins of the fossa are slightly thickened and rounded. The under side of the jaw is irregularly flattened and the area between the denticles and shank is concave. The upper side of the jaw is mostly convex, especially in the fossa.

Due to the long and narrow anterior region this form is unlike other species of the genus.

Occurrence: The species was found in the Cobourg and Rockland. Most of the specimens came from Collingwood, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,341. Paratypes are in Princeton University and the Royal Ontario Museum of Paleontology.

***Lumbriconereites tuberosus* sp. nov.**

Maxilla I, plate I, figs. 34-36.

The jaw is large, narrow and elongate. Specimens measure between 0.83 mm. and 1.4 mm. in length. A series of eighteen to twenty conical, sharp-pointed denticles extends nearly the full length of the jaw. The fang is long, sharp and slightly hooked. It is out of alignment with the rest of the denticles. The second denticle is large and may be in an oblique position to the under side of the jaw. The next two or three denticles are thin or small and perpendicular to the surface of the jaw. Following these are a number of large denticles. The remainder decrease gradually in size to the posterior end. Except for anterior denticles, all point in a backward direction. Beginning at about the mid-point, the inner margin is extended to a narrow flange that extends to the posterior end. In the anterior portion of the outer margin a broadly rounded flange is present that also may be irregular in shape. The posterior is truncate and the extremity may end in a knob-like projection. A wide, shallow fossa occupies about two-thirds the upper side of the jaw. The margins of the fossa are not thickened. The under side of the jaw is convex except for the areas adjacent to the denticles.

This is probably a right jaw. It is not possible to determine the asymmetrical left jaw. *L. cooperi* Eller (1938), figs. 1-4, is similar to *L. tuberosus* except for the outer and inner margins and the posterior end. There is a general resemblance between *L. scrobiculus* Eller (1943) and *L. tuberosus*. They differ in outline and the arrangement of the denticles.

Occurrence: The species was found in the Rockland and Cobourg and the

figured specimen is from the escarpment about three miles north of Lindsay, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,191.

***Lumbriconereites kosinskii* sp. nov.**

Maxilla I, plate II, figs. 1, 2.

The jaw is small, irregular in outline and the figured specimen measures 0.32 mm. in length. A series of more than twenty minute, sharp pointed, backward directed denticles extends the full length of the jaw. The first denticle or fang is large and hooked. When the jaw is observed from the upper side, two small flanges are discernible in the anterior part of the jaw. The left one is rounded with a small indentation or bight posterior to it. The right flange is small and pointed. A large, irregular fossa extends nearly the full length of the upper side. The margins of the fossa are thickened and rounded.

L. kosinskii is very similar to *L. projectus*. They differ in number of denticles and the shape and size of the flanges. A large number of specimens of *L. projectus* were present in the fauna and they showed very little variation. For these reasons the above described form is being placed in a separate category. There is a resemblance between *L. cooperi* Eller (1938), figs. 7, 8, and *L. kosinskii*.

Occurrence: Just west of Collingwood, Ontario, the Cobourg limestone outcrops along Georgian Bay.

Type: The holotype is in the Carnegie Museum, number 25,320.

***Lumbriconereites dissimilis* sp. nov.**

Maxilla I, plate II, figs. 3-6.

The jaw is elongate and all specimens are about 0.75 mm. in length. The lateral margins are gently curved and are nearly parallel to each other. Along the inner margin a series of about fourteen small, blunt, backward directed denticles extends the full length of the jaw. The denticles are nearly the same size and only decrease slightly to the posterior end. The first denticle or fang is slightly larger. It is quite straight and points in a forward direction. A large fossa occupies nearly all the upper side of the jaw. One margin of the fossa is thin and is broken on all specimens. At the anterior end of this margin a shank of some sort was probably

present. The other lateral margin of the fossa is thickened and becomes very wide at the posterior end. The anterior margin is straight and forms sharp angles with the lateral margins. The posterior end is blunt and indented. The under side of the jaw is convex except for the area at the posterior end between the denticles and the outer margin.

Lumbriconereites dissimilis is probably a left jaw. It resembles only slightly other species of the genus. None of the specimens are very well preserved and it is possible the shank is better developed than is shown in the figures. Its position in the anterior part of the jaw is unusual.

Occurrence: This species was found only at the St. Maurice Quarry, north of Three Rivers, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,453; also a paratype, number 25,454.

***Lumbriconereites angustifossus* sp. nov.**

Maxilla I, plate II, figs. 7, 8.

The jaw is elongate, wide at about the mid-area but narrowing rapidly to the posterior end. The figured specimen measures 1.48 mm. in length. Along the inner margin a series of sixteen conical, backward directed denticles extends nearly the full length of the jaw. The first denticle or fang is large and slightly hooked. The second denticle is large but is followed by a much smaller one. The remaining denticles are large and decrease in size only near the posterior end. When the jaw is observed from the under side it may be seen that the denticles are not perpendicular but are inclined inward. The lateral margins are irregular in shape. An angular shank is present in the posterior half of the jaw. It forms the anterior margin of a deep crescent-shaped bight. The surface of the shank is irregularly concave and convex. On the upper side a large fossa occupies a little more than one-half of the jaw. Except for a narrow, deep, central trough, the fossa is shallow with an irregular bottom surface. The unevenness of the surface of the shank and fossa are reflected on the under surface of the jaw. The posterior extremity of the jaw is narrow and truncate.

There is a slight resemblance between *L. deflexus* Eller (1942) and *L. angustifossus*, especially in the angularity of the shank. The fossa in each of the two species is quite different.

Occurrence: The figured specimen is from the Gloucester at Craigleith, Ontario, but this form is common in the Rockland.

Type: The holotype is in the Carnegie Museum, number 25,433.

***Lumbriconereites* ? *okulitchi* sp. nov.**

Maxilla I, plate II, figs. 9, 10.

The jaw is triangular in outline, wide anteriorly, and tapers to a narrow posterior extremity. The figured specimen measures 0.78 mm. in length. Along the outer margin a series of twelve large, conical, sharp-pointed denticles extends the full length of the jaw. The fang is large, pointed, and wide at the base. The second denticle is small and is followed by a larger tooth. Except for the fang the fourth denticle is the largest in the series. The remainder of the denticles decrease in size gradually to the posterior end. The denticles are directed only slightly backward. A deep crescent-shaped indentation or bight is present on the outer lateral side of the jaw and forms the posterior margin of a narrow shank. When the jaw is viewed from the under side the gracefulness of the outline, especially the curvature of the outer margin, can be observed. The anterior margin is straight or slightly incurved. A fossa occupies nearly the complete upper side of the jaw. It is wide anteriorly but becomes very narrow in the posterior half. The margins of the fossa are slightly thickened and rounded.

Lumbriconereites ? *okulitchi* differs from other species of the genus due to the straightness of the anterior margin. Other characteristics are similar to the right jaws of several species of *Lumbriconereites*.

Occurrence: The figured specimen is from St. Maurice Quarry north of Three Rivers, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,455.

***Lumbriconereites assimilis* sp. nov.**

Maxilla I, plate II, figs. 11-21.

The jaw is elongate and measures from 0.72 mm. to 1.62 mm. in length. On the outer margin a series of fifteen to nineteen small, conical, sharp-pointed denticles extends nearly to the posterior end. The first denticle or fang is of medium size and points in a forward direction. The following four or five denticles are small but the second denticle may be slightly larger. These denticles vary in the direction in which they point from forwards to backwards. The remaining denticles are larger but decrease in size to the posterior, and they are backward directed. A large fossa occupies about three-quarters of the upper side of the jaw. The margins of the fossa are slightly thickened. The jaw tapers to an acute posterior extremity.

L. assimilis resembles *L. scrobiculus* Eller (1944) and *L. cooperi* Eller (1938) rather closely. They differ, however, in several respects. The fang of *L. assimilis* is heavier, not so long, and points in a more forward direction than in the two above mentioned species. The posterior end of *L. scrobiculus* and *L. cooperi* is more rounded than that of *L. assimilis*. The shapes and lengths of the fossa do not agree in the three species. The outer margin of *L. scrobiculus* and *L. cooperi* has the suggestion of a small shank, while the outer margin of *L. assimilis* is straighter or slightly rounded. There is a slight likeness between *L. copiosus* Eller (1942) and *L. assimilis*, especially when viewed from certain sides. The presence of a definite shank on *L. copiosus* and the larger fossa of *L. assimilis* constitute differences.

Occurrence: This species was very common in the Rockland and was found from Kirkfield, Ontario, to Lowville, New York.

Types: The holotype is in the Carnegie Museum, number 25,213. Paratypes have been sent to Princeton University and the Royal Ontario Museum of Paleontology, while paratypes, numbers 25,215, 25,217, 25,219 and 25,221 remain in the Carnegie Museum.

***Lumbriconereites copiosus* ? Eller**

Maxilla I

Lumbriconereites copiosus Eller, 1942, Annals, Carnegie Museum, vol. xxix, pp. 245, 246, pl. 1, figs. 7-12.

Specimens of *Lumbriconereites copiosus* Eller from the Meaford formation, Upper Ordovician, were found in large numbers at Streetsville, Ontario, but they varied somewhat in form. Two specimens attributable to this species were found in the Cobourg at Collingwood, Ontario. One doubtful specimen was collected in the Rockland at Kirkfield, Ontario.

***Lumbriconereites deflexus* ? Eller**

Maxilla I

Lumbriconereites deflexus Eller, 1942, Annals, Carnegie Museum, vol. xxix, pp. 244, 245, pl. 1, figs. 5, 6.

These specimens are referred to *Lumbriconereites deflexus* Eller with some doubt. They were found at a number of localities in the Trenton from Collingwood, Ontario, to Watertown, New York. The original forms, found in the Meaford, Upper Ordovician at Streetsville, Ontario, are much larger in size.

Genus ARABELLITES, Hinde, 1879

Maxilla I, plate II, figs. 22-25.

Arabellites rectidens ? Eller

Arabellites rectidens Eller, 1940, Annals, Carnegie Museum, Vol. 28, p. 15, pl. 3, figs. 1-5.

This species is common in the Manitoulin beds of Silurian age in Ontario and New York. A form, *Arabellites spicatus* var. *contractus* Hinde (1880) from the Wenlock group of England, later changed to *Arabellites contractus* by Hinde (1882) in his description of the jaws from the Silurian of Gotland, is very similar to *Arabellites rectidens*. This form seems to have both a wide geological and geographical range. The specimens from the Trenton rocks range from 0.35 mm. to 0.64 mm. in length. They average less than half the size of the Manitoulin forms. The number of denticles varies from six to eight. The principal difference between the Manitoulin and Trenton specimens is the shape of the fang. In most of the Manitoulin forms the fang points in a forward direction, while the fangs of the Trenton forms are well hooked. Whether this constitutes a specific difference the writer is unable to decide at the present time.

Occurrence: *Arabellites rectidens?* Eller is found throughout the Trenton beds from Collingwood, Ontario, to Henderson, New York.

Types: The holotype is in the Carnegie Museum, number 25,327; a paratype no. 25,328. A specimen has been deposited in Princeton University.

Arabellites (?) claytonae sp. nov.

Maxilla I, plate II, figs. 26, 27.

The jaw is wide, elongate, and measures from 0.62 mm. to 0.75 mm. in length. The posterior end is truncate. A series of nine or ten sharp-pointed, conical, backward directed denticles extends the full length of the jaw. The fang is small, sharp-pointed and is directed in a forward position. The first few denticles are large and uniform in size, and then they become smaller gradually to the posterior end. The outer margin of the jaw is irregularly curved to a small flange. A deep fossa begins opposite the second or third denticle and extends to the posterior end. The inner and anterior margins of the fossa are thickened and rounded.

Both the upper and under sides of the jaw are irregularly concave and convex.

Arabellites perpensus Eller (1942) is similar to *Arabellites claytonae*, except for the size of the fossa and the shape of the outer margin. The fossa of *Arabellites perpensus* and *Arabellites claytonae* do not resemble those of most species of *Arabellites*, but are more like those found in *Ænonites*. The truncate posterior end is not characteristic of *Ænonites* but is found generally in *Arabellites claytonae*.

Occurrence: Most specimens were found in the Rockland at Lakefield, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,303. A paratype is in the collections of the Royal Ontario Museum of Paleontology.

***Arabellites ? doutti* sp. nov.**

Maxilla I, plate II, figs. 28-29.

The jaw is large and wide, and terminates with a truncate posterior extremity. Specimens range from 1.16 mm. to 1.35 mm. in length. A series of nine to eleven sharp-pointed, conical, backward directed denticles extends for about two-thirds the length of the jaw. A long, narrow, well-hooked fang is oblique to the surfaces of the jaw. The denticles decrease gradually in size to the posterior end and are turned in an oblique position to the under surface. A large, shallow fossa extends the full length of the jaw. The inner margin of the fossa is thin but well rounded, while the anterior margin is wide, thick and flattened. This heavy part of the margin continues part way along the outer side of the jaw. The remainder of the outer margin is thin and usually broken. The under side of the jaw is convex with some flattened areas.

This species was placed in the genus *Arabellites* with doubt. The fossa of this species is not characteristic of the genus *Arabellites* but resembles more a species of *Ænonites*. The truncate posterior denticles and hook are characteristic of *Arabellites*. *A. perpensus* Eller (1942) is quite similar to *A. doutti*. They differ in the length of the fang, position of the denticles and in certain details of the fossa.

Occurrence: The form was found only in the Rockland limestone at Dalrymple and Lakefield, Ontario, and in the Cobourg at Collingwood, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,289.

Genus *ILDRAITES*, Eller, 1936

Ildraites camurus sp. nov.

Maxilla I, plate II, figs. 30-37.

The jaw is small, wide, and measures from 0.32 mm. to 0.67 mm. in length. Just adjacent to the inner margin a series of seven to ten small, sharp, conical, backward directed denticles extends to the posterior end. The denticles are oblique to the under surface of the jaw. The fang is long, sharp, conical, well hooked, and oblique in its position to the upper side of the jaw. It points in an opposite direction from the denticles. A small bight present on the outer margin emphasizes a small but wide shank. The posterior end of the jaw is narrow, acute and slightly curved. The under surface of the jaw is convex except for the area adjacent to the denticles. A wide, shallow fossa occupies all the upper surface of the jaw except the fang.

There is a general resemblance between *Ildraites camurus* and *I. peramplus* Eller (1942). The two species differ in their width and length and especially in the length of the area posterior to the shank. The fang of *I. camurus* is smaller, thinner and more oblique to the surface of the jaw than *I. peramplus*. There is also a general similarity, though not very close, between *Ildraites* (*Arabellites*) *marcellusensis* (Eller, 1934), *I. bipennis* (Eller, 1936), and *I. camurus*.

Occurrence: *Ildraites camurus* is common throughout the Trenton and was found from Collingwood, Ontario, to Lowville, N. Y.

Types: The holotype is in the Carnegie Museum, number 25,181; paratype no. 25,184. Paratypes have been deposited in the Royal Ontario Museum of Paleontology and in Princeton University.

Ildraites fuehreri sp. nov. *

Maxilla I, plate II, figs. 38-40.

The jaw is subtriangular in outline and measures from 0.89 mm. to 1.21 mm. in length. A series of ten sharp, conical, backward directed denticles extends in a straight line to the posterior end. The denticles, including the fang, are slightly oblique to the under surface of the jaw. The denticles decrease in size gradually to the posterior end. A prominent fang, well hooked, is not in alignment with the other denticles and points in the opposite direction. There is a small space between the fang and the next denticle. The anterior part of the jaw is wide and the posterior extremity is acute, when viewed directly from the under or upper sides. A

shallow but deeply cutting crescent-shaped bight emphasizes the width and shortness of the shank and the narrowness of the posterior end. The margin surrounding the fossa is slightly thickened and rounded. The under surface of the jaw is convex at the shank but flattened or concave adjacent to the denticles.

This form is typical in its general characteristics for the genus, but it does not resemble any particular species closely enough to warrant a synopsis of its relationships.

Occurrence: The type specimen is from Lindsay, Ontario. Other forms were found in the Cobourg (?) at Trenton, Ontario, and in the Denmark, Sherman Fall at Copenhagen, New York.

Types: The holotype is in the Carnegie Museum, number 25,225. A paratype has been deposited in Princeton University.

***Ildraites rarus* sp. nov.**

Maxilla I, plate II, figs. 41-43.

The jaw is wide and angular in outline. On a slightly curved inner margin a series of eleven or twelve sharp, conical, backward directed denticles extends nearly to the posterior end. The denticles are slightly oblique to the under surface and they decrease in size gradually, posteriorly. The fang is large, pointed, and hooked. The second denticle is small and in some specimens the third denticle is of similar size. Measurements of the jaw range from 0.62 mm. to 0.81 mm. in length. On the slightly curved outer margin a wide, deep, crescent-shaped bight forms a long narrow shank and a very narrow posterior area. A shallow fossa occupies most of the upper side of the jaw. The margins of the fossa are rounded and slightly thickened. On the under side, the area between the denticles and the outer margin is concave. The upper side is slightly convex but the jaw as a whole is quite flattened.

Ildraites rarus does not resemble very closely any other species of the genus. The narrowness of the anterior and posterior ends and the shallowness of the jaw mark its difference from other forms.

Occurrence: The figured specimen is from the Rockland near Lindsay, Ontario. Other specimens were found in the Cobourg at Cobourg, Ontario, and in the Hull at Hull, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,243. Paratypes have been deposited in the Royal Ontario Museum of Paleontology and Princeton University.

Genus *LEODICITES*, Eller, 1940

***Leodicites brooksi* sp. nov.**

Maxilla II, plate III, figs. 1-4.

The jaw is wide and short, measuring from 0.29 mm. to 0.52 mm. in length. Measurement of the width of one specimen was 0.52 mm. to a length of 0.38 mm. A series of seven to ten conical, sharp-pointed to blunt denticles extends to the posterior end. The denticles are nearly perpendicular to the under side of the jaw. The fang or first denticle is long, thin, and sharp-pointed and seems to be a part of the anterior margin and shank. The remaining denticles decrease in size only slightly to the posterior. A crescent-shaped bight is present on the lower side of the outer margin and it forms a narrow shank with the anterior margin. The upper side of the outer margin is extended and is usually thin and broken. The side of the jaw adjacent to the narrow shank is concave or flattened; the opposite side is convex. A wide fossa occupies nearly all the upper surface of the jaw. The margin of the under side of the fossa is slightly thickened while the upper one is thin.

There is a general similarity between *Leodicites brooksi* and *Arabellites minutus* Stauffer (1939). The shank and outer margins differ considerably.

Occurrence: *Leodicites brooksi* was found at Lakefield, Ontario, and at Three Rivers, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,249; paratype no. 25,250. Paratypes have been deposited with the Royal Ontario Museum of Paleontology and Princeton University.

***Leodicites biformis* sp. nov.**

Maxilla II, plate III, figs. 5-8.

The jaw is subtriangular in shape and measurements range from 0.62 mm. to 0.78 mm. in length. Along the curved inner margin a series of from ten to twelve large, blunt, backward directed denticles extends to the posterior end. The fang is slightly larger than the other denticles and appears to be a continuation of the anterior margin. The denticles are nearly perpendicular to the under surface and are slightly hooked. The second denticle may be smaller, but the denticles are quite uniform in size, decreasing only slightly to the posterior end. The outer margin is

notched by a broad, crescent-shaped bight which forms a very narrow, pointed shank. An outer margin bears a small, second shank slightly posterior to the principal shank. The anterior margin is straight when viewed from the side. A narrow, deep fossa begins with the shank and extends to the posterior end of the upper side. A slightly thickened margin is present around the fossa. When the jaw is observed from underneath, the right side is concave while the opposite side is convex.

The general characteristics of *Leodicites biformis* resemble *Leodicites acclivis* Eller (1942) and *Lumbriconereites clavatus* Eller (1941).

Occurrence: *Leodicites biformis* was found only in the Rockland. The figured specimen is from Lindsay, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,331.

***Leodicites artus* sp. nov.**

Maxilla II, plate III, figs. 9, 10.

The shape of the jaw is triangular; the length is from about 0.64 mm. to 0.93 mm. Along the curved inner margin a series of twelve or thirteen triangular shaped denticles extends nearly to the acute posterior end. The first denticle is slightly smaller than the following ones and it seems to be an extension of the anterior margin. The denticles increase slightly in width and then decrease in size to the posterior end. All the denticles are directed backward. A slightly curved anterior margin terminates in a short blunt shank. A shallow bight is present on the outer margin and it emphasizes the width and bluntness of the shank. The under side is concave except for an area near the fang. The upper side is highly convex. A deep fossa extends nearly the full length of the jaw. The margin of the fossa is slightly thickened and rounded.

Leodicites artus is similar to *L. summus* Eller (1942) except for the shape of the denticles and shank. The anterior margin of *L. artus* is straighter and the indentation on the outer margin is deeper. Except for the size and arrangement of the denticles and the width of the jaw, *Eunicites hebis* Hinde (1882) resembles *Leodicites artus*.

Occurrence: This form was found only in the Rockland. It was especially common at Lakefield, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,295. Paratypes have been deposited in the collections of the Royal Ontario Museum of Paleontology and Princeton University.

Leodicites semiquadratus sp. nov.

Maxilla II, plate III, figs. 11, 12.

The jaw is wide, angular, and measures from 0.32 mm. to 1.05 mm. in length. Some specimens are as wide as they are long. A series of from eight to twelve sharp-pointed conical denticles extends the full length of the inner margin. Most of the denticles are perpendicular to the inner margin or may point in a slightly forward direction. The denticles decrease in size slightly to the posterior end. The first denticle is long, narrow, and sharp-pointed. A small crescent-shaped bight is present along the lower side of the outer margin and forms a narrow shank with the anterior margin. The upper side of the jaw is very wide and its margin is thin and usually broken. The anterior margin including the fang is straight or slightly incurved. A wide fossa occupies the complete upper part of the jaw. The lower margin of the fossa is thickened and rounded while the upper one is thin and usually broken. The upper side of the jaw between the denticles and the shank is slightly concave; the opposite side of the jaw is convex.

Leodicites brooksi is similar to *L. semiquadratus* in many ways. The two species differ in the character of the shank and indentation on the outer margin and the shape of the fang and anterior margin. *L. semiquadratus* is much more angular in outline and the underside is not as convex as *L. brooksi*.

Occurrence: Specimens were found in the Rockland at Lindsay, Ontario, and in the Middle Trenton near Three Rivers, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,251.

Leodicites antefixus sp. nov. *

Maxilla II, plate III, figs. 13, 14.

The jaw is elongate and narrowly subtriangular in outline. The figured specimen measures 0.86 mm. in length. Along the nearly straight inner margin a series of seven large, conical, sharp-pointed, backward directed denticles extends the full length of the jaw. The first denticle is much larger than any of the others. The denticles decrease gradually in size to the posterior end. The anterior margin is slightly incurved. It terminates in a narrow shank which points in a forward direction. From the shank the outer margin curves slightly and then becomes nearly straight to the posterior end. A deep, narrow fossa occupies nearly the full length of the

upper side of the jaw. The margins of the fossa are thickened and rounded. The under side of the jaw is convex.

Arabellites magnificus Stauffer (1939) from the Devonian of Ohio and Ontario, *Leodicites magnificus* (Stauffer), figured by Eller (1940) from the Windom of New York, and *L. barbatus* Eller (1942) from the upper Ordovician of Ontario are similar to *L. antefixus* in outline. The shape of the fossa and the size and arrangement of the denticles of *L. antefixus* differ from those species.

Occurrence: The figured specimen is from the Rockland at Kirkfield, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,436.

***Leodicites ? continuus* sp. nov.**

Maxilla II or III, plate III, figs. 15, 16.

The jaw is short and subtriangular in shape. The figured specimen measures 0.35 mm. in length. A series of seven sharp, conical denticles of various sizes are present along the inner margin. The first denticle is a continuation of the straight anterior margin. The next three denticles increase in size to about the mid-area where they become smaller to the posterior end. All denticles are nearly perpendicular to the straight ones. On the outer margin a small flange is present in the posterior half of the jaw. A shallow bight emphasizes the smallness of the flange. All of the upper side of the jaw is occupied by a deep but narrow fossa. The margins of the fossa are rounded and rather thin. The sides of the jaw are irregularly convex.

Leodicites ? continuus does not resemble other forms very closely and it was questionable under just what genus it should be placed. The presence of a shank and bight, although very small and not exactly in the usual position, places the species in the genus *Leodicites* rather than in *Ænonites* or *Staurocephalites*.

Occurrence: The figured specimen is from the Rockland at Belleville, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,357.

***Leodicites collatatus* sp. nov.**

Maxilla III, plate III, figs. 17, 18.

The jaw is elongate and angular except for the right outer margin which is gently incurved. The figured specimen measures 0.48 mm. in length.

A series of six blunt, triangular shaped denticles extends along the curved inner margin to the posterior end. The anterior end is extended forward to a pointed shank. The posterior extremity is acute and rounded. A shallow fossa occupies the upper side of the jaw and extends into the shank. The margins of the fossa are slightly thickened. On the under side and adjacent to the denticles the jaw is slightly concave.

The forward directed anterior end or shank is unlike any other species of this genus. *Leodicites convallis* is similar except for the backward directed shank.

Occurrence: The figured specimen is from the Rockland at Paquette Rapids, Ottawa River, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,630.

***Leodicites exilis* sp. nov.**

Maxilla II, plate III, figs. 19, 20.

The jaw is small, subtriangular in outline with a straight anterior margin and a narrow blunt posterior end. The figured specimen measures 0.48 mm. in length. A series of eleven conical, sharp-pointed, backward directed denticles extends nearly the full length of the jaw. The first denticle is smaller than the second. The remaining denticles decrease in size gradually to the posterior end. A large bight occupies the inner side of the jaw and forms a narrow, slightly angular shank with the anterior margin. A narrow fossa extends the full length of the jaw and also extends into the shank. The upper side of the jaw is convex while the under side is flattened or slightly concave.

Except for the denticles, *Leodicites exilis* is similar to *L. reimanni* Eller (1941). There is a slight resemblance between *L. creditensis* Eller (1942) and *L. exilis*. *Eunicites anchorales* Eller (1934) is like *Leodicites exilis* in outline except at the anterior end and the character of the denticles. *Eunicites hebes* Hinde (1882) figure 9, is quite similar to *Leodicites exilis* in outline and differs only slightly in its details.

Occurrence: The figured specimen is from the Cobourg at Collingwood, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,363.

***Leodicites arquatus* sp. nov.**

Maxilla II, plate III, figs. 21, 22.

The jaw is subtriangular in outline, wide anteriorly and tapers to an acute posterior end. The anterior margin is incurved. On the inner mar-

gin, a series of six or seven large, conical, sharp-pointed, backward directed denticles extends to the posterior extremity. The first denticle or fang is large and hooked. The denticles decrease in size uniformly. The outer margin is notched by a bight at the anterior end which makes a narrow arched shank. Posteriorly the outer margin is straight. A narrow, deep fossa begins in the shank and continues to the posterior end. The margins of the fossa are very thick and rounded. The under surface is flattened and the upper surface is convex. In length the form measures from 0.32 to 0.43 mm.

While *Leodicites arquatus* resembles several species of the genus, the anterior margin and the character of the fossa distinguishes it from them.

Occurrence: This species was found in the Rockland at Lindsay and Dalrymple, Ontario, and in the Cobourg at Collingwood, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,240.

***Leodicites agostini* sp. nov.**

Maxilla II, plate III, figs. 23, 24.

The jaw is triangular in outline and measures about 0.7 mm. in length. A series of nine or ten large, conical, sharp-pointed denticles extends the full length of the jaw. The denticles are mostly perpendicular to the inner margin and decrease in size to the posterior end. The first denticle or fang is large and is a continuation of the short, straight anterior margin. A shallow bight is present on the inner margin and it forms a small, forward-pointing shank. The fossa is angular, deep and occupies the entire outer side. A thick, well rounded margin is present and surrounds the fossa. Both the upper and under sides are irregularly convex.

Leodicites agostini does not resemble any other form very closely and no comparison will be made at this time.

Occurrence: The quarry at Lakefield, Ontario, is considered to be of Rockland age. The figured specimen came from this locality.

Type: The holotype is in the Carnegie Museum, number 25,248.

***Leodicites anticus* sp. nov.**

Maxilla II, plate III, figs. 25, 26.

In outline the jaw is subtriangular, wide anteriorly and posteriorly. The width and length of the jaw are nearly equal. The figured specimen measures 0.38 mm. in length. A series of nine sharp to blunt denticles

extends along the curved inner margin and around the posterior end. The first denticle or fang is large, conical and points in a forward direction. The second denticle is small and conical. The remaining denticles are large and blunt and decrease in size to the posterior end. The four posterior denticles are hooked toward the under surface of the jaw. The anterior margin is incurved from the fang to the shank, which curves forward. From the shank to the posterior end the outer margin is slightly incurved. The under side of the jaw is convex except at the posterior end, adjacent to the denticles, where it is concave or flattened; the opposite side is convex. A deep, narrow fossa extends along the outer margin nearly the full length of the jaw. The margin of the fossa is thickened and rounded.

This form is similar to *Leodicites streetsvillensis* Eller (1942), except for the shape of the shank and posterior end. There is also a slight resemblance between *L. caleyi* Eller (1944) and *L. anticus*.

Occurrence: The figured specimen was found in the Rockland at Gamebridge, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,270.

***Leodicites absolutus* sp. nov.**

Maxilla II, plate III, figs. 27-29.

In outline the jaw is subtriangular. The jaw is wide and the figured specimen measures 0.64 mm. in length. A series of sixteen small, blunt denticles extends in a curved line the full length of the jaw. The fang is sharp, conical and hooked. The first three denticles following the fang are of medium size; the remainder are small and compact. The denticles are nearly perpendicular to the under side of the jaw. The inner margin is curved anteriorly, but becomes nearly straight in the posterior half. The outer margin is notched by a crescent-shaped bight which forms a wide, blunt shank. The under surface is concave between the denticles and the shank. A wide, shallow fossa occupies about three-quarters of the upper surface of the jaw. The margin of the fossa is thickened and rounded.

Leodicites absolutus does not closely resemble the other species of the genus. Its width and the curvature of the margins are unlike other forms.

Occurrence: The figured specimen was found in what is said to be the Selby member of the Rockland at Lowville, New York, on Mill Creek at the State Street bridge.

Type: The holotype is in the Carnegie Museum, number 25,245.

***Leodicites angustisulcus* sp. nov.**

Maxilla II, plate III, figs. 30-32.

The jaw is narrow and angular in outline. The figured specimen measures 0.86 mm. in length. A series of eleven flattened, slightly conical, backward directed denticles extends the full length of the jaw. The first denticle is short, wide, and points in a forward direction. The second is large and is followed by a small one. The next two or three denticles are large and the remaining ones decrease in size rapidly to the posterior end. The inner margin is irregularly curved. The outer margin is notched by a deep crescent-shaped bight which forms a narrow shank with the anterior margin. A narrow but deep fossa extends the full length of the jaw and the shank. The margins of the fossa are slightly thickened and rounded. The under surface of the jaw is irregularly convex.

Leodicites angustisulcus resembles very closely *L. acclivis* Eller (1942). The two species differ in the width of the fossa, length of the shank, and the shape and arrangement of the denticles.

Occurrence: The type is from the Middle Trenton at St. Maurice Quarry north of Three Rivers, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,518.

***Leodicites breviculus* sp. nov.**

Maxilla II, plate III, figs. 33-37.

The jaw is small, measuring in length from 0.29 mm. to 0.62 mm. A series of six to eight long, conical, sharp-pointed, backward directed denticles extends the full length of the slightly curved inner margin. The second denticle may be smaller but the remaining ones are large and decrease in size gradually to the posterior end. All the denticles are slightly hooked and are nearly perpendicular to the under side. The fang is about the same size as the larger denticles and appears to be a continuation of the anterior margin. The inner margin is irregular in outline. A crescent-shaped bight is present on the outer margin; it forms a small acute shank with the anterior margin. The posterior end is acute, while the anterior end is broad and incurved. A triangular-shaped fossa occupies the upper surface including the shank. The margins of the fossa are thickened and rounded. The under side is generally convex, with concave areas adjacent to the denticles.

Leodicites breviculus resembles *L. acclivis* Eller (1942) and *Lumbri-*

conereites clavatus Eller (1941) in a general way. *L. breviculus* and *L. biformis* are quite similar except for the character of the denticles and the anterior end and shank.

Occurrence: The geological and geographical distribution of *L. breviculus* is extensive. The species is found from Collingwood, Ontario, to Watertown, New York.

Type: The holotype is in the Carnegie Museum, number 25,228.

***Leodicites clementi* sp. nov.**

Maxilla II, plate III, figs. 38-40.

The jaw is subtriangular and measures in length from 0.32 mm. to 0.75 mm. A series of from seven to nine conical denticles extends the full length of the curved inner margin. The denticles are nearly perpendicular to the under surface. The fang is long, thin, and pointed and is a continuation of the straight thickened anterior margin. The denticles decrease gradually in size to the posterior end. On the outer margin a deep crescent-shaped bight is present, which forms, with the anterior margin, a narrow shank. The area adjacent to the shank is concave, while the opposite side of the jaw is highly convex. A narrow, deep fossa occupies most of the upper side of the jaw. The margins of the fossa are thickened and rounded.

Except for the shape and arrangement of the denticles there is a general similarity between *Leodicites clementi* and *Arabellites magnificus* Stauffer (1939).

Occurrence: This form was found throughout the Trenton formation. It was common in the Rockland at Lakefield, Ontario, and was found in the Sherman Fall at Henderson, New York, the Hallowell member of the Cobourg at Copenhagen, New York, and in the Denmark of the Sherman Fall at Trenton Falls, New York.

Types: The holotype is in the Carnegie Museum, number 25,297. A paratype is in the collection of Princeton University.

***Leodicites buris* sp. nov.**

Maxilla II, plate III, figs. 41-43.

In outline the jaw is narrowly subtriangular with gracefully curved margins. Specimens measure in length from 0.72 mm. to 1.08 mm. A series of ten to twelve blunt, triangular-shaped denticles extends to the posterior end. The first denticle or fang is small and hooked. The second

denticle is very large and it is followed by a minute tooth. The remaining denticles are large and decrease in size to the posterior end. The inner margin is broadly curved anteriorly and forms a wide, triangular-shaped area when viewed from the side. A crescent-shaped bight is present on the outer margin and it forms, with the anterior margin, a narrow hooked shank. The anterior margin is gently rounded and the posterior end is acute. The under side is convex except at the anterior, where it is flattened or slightly concave. A narrow irregular fossa occupies most of the upper side. The margins of the fossa are slightly thickened and rounded.

There is a general similarity between *Leodicites buris* and *L. acclivis* Eller (1942). The shape and arrangement of the denticles and the shape of the margins and fossa are different. *L. breviculus* is somewhat similar to *L. buris* when viewed from the under side.

Occurrence: The species is limited to the Cobourg and found at Collingwood and Cobourg, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,321, and a paratype is in the Royal Ontario Museum of Paleontology.

***Leodicites bisulcus* sp. nov.**

Maxilla II, plate III, fig. 44.

The jaw is small and subtriangular in shape. The figured specimen measures 0.29 mm. in length. Along the arched inner margin a series of about fifteen small, conical, sharp-pointed, backward directed denticles extends the full length of the jaw. The first four denticles are about the same size while the remaining ones are minute and do not decrease appreciably in size to the posterior end. The curved anterior margin is notched, forming two small shanks. A shallow bight on the outer margin emphasizes the shortness of the shanks. A narrow fossa begins between the two shanks and occupies the full length of the outer side of the jaw. The margins of the fossa are rounded and slightly thickened. The upper surface of the jaw is convex while the under surface is concave or flattened.

L. bisulcus has more and smaller denticles than observed in most species of *Leodicites*. The notched anterior end has not been found in any other form of this genus.

Occurrence: The figured specimen is from the Cobourg at Collingwood, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,356.

Leodicites angulus sp. nov.

Maxilla II, plate III, fig. 45.

In outline the jaw is subtriangular with nearly straight margins. The form measures from 0.62 mm. to 0.86 mm. in length. Along the inner margin a series of sharp, conical, irregularly shaped, backward directed denticles extends to the posterior end. The first denticle is small and slightly hooked. The second denticle is large and thickened, while the third denticle may be small. The remaining denticles decrease in size to the posterior end and are very much backward directed. The anterior margin is nearly straight. On the outer margin an angular bight forms a shank with the anterior margin. The shank has blunt or square ends and does not seem to be broken. The under side of the jaw is convex, except for a slight indentation along the anterior margin. A large fossa extends nearly the full length of the upper surface of the jaw.

There is a resemblance between *Leodicites barbatus* Eller (1942) from the Meaford, Upper Ordovician of Streetsville, Ontario, and *L. angulus*. The angular outline of the jaws and the arrangement of the denticles are similar, but the species differs in the angle of the shank and the shape and size of the fossa.

Occurrence: The species was found in the Rockland and in the Cobourg. The figured specimen is from Collingwood, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,343, and a paratype is in Princeton University.

Leodicites convallis sp. nov.

Maxilla II or III, plate IV, figs. 1-3.

The jaw is elongate, rounded, and with nearly parallel sides. The anterior end is wide and rounded while the posterior tapers abruptly to an acute end. A series of eight to twelve conical, blunt to sharp-pointed, backward directed denticles extends the full length of the jaw. The first denticle is long and narrow and is followed by smaller teeth that decrease only slightly to the posterior end. A large, deep, round bight is present on the inner margin. It forms a thin, nearly straight shank with the anterior margin. The upper side of the jaw including the shank is occupied by a deep fossa. The margins of the fossa are thickened and rounded. The under side of the jaw is highly convex. The figured specimen measures 0.48 mm. to 0.71 mm. in length.

There is a slight resemblance in outline between *Leodicites acclivis* Eller (1942) and *L. convallis*. The denticles of the two species differ widely.

Occurrence: The figured specimens are from the Rockland, which outcrops in a low escarpment about three miles north of Lindsay, Ontario, and from the Trenton north of Three Rivers, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,373; also a paratype, number 25,517.

***Leodicites corbis* sp. nov.**

Maxilla III, plate IV, figs. 4, 5.

The jaw is large and wide, anteriorly, but narrows abruptly at the mid-area and terminates in an acute posterior ending. A series of ten to twelve blunt denticles extends to the posterior end along the curved inner margin. The denticles gradually decrease in size posteriorly. A shallow, round bight is present on the inner margin. It forms a small shank with the broadly rounded anterior margin. On the upper side of the jaw a deep fossa occupies the complete area including the shank. The margins of the fossa are slightly thickened. On the under side of the jaw the surface to the right of the denticles is gently convex to flattened; the left side is slightly concave. The figured specimen measures 0.99 mm. in length.

Leodicites corbis does not resemble any other species of this genus very closely due to the broadly rounded anterior end.

Occurrence: The figured specimen is from the Rockland at Paquette Rapids on the Ottawa River, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,631.

***Leodicites creditensis* ? Eller**

Maxilla II.

Leodicites creditensis Eller, 1942, *Annals, Carnegie Museum*, vol. xxix, pp. 257, 258, pl. 3, figs. 9, 10.

In the Meaford, Upper Ordovician at Streetsville, Ontario, *Leodicites creditensis* Eller was very common. Specimens identified as this species were found in the Trenton and were common at Dalrymple and at Kirkfield, Ontario. Duplicate specimens have been deposited in the Royal Ontario Museum of Paleontology and Princeton University.

Genus *STAUROCEPHALITES*, Hinde, 1879

***Staurocephalites appositus* sp. nov.**

Maxilla II, plate IV, figs. 6-9.

The jaw is elongate, broadly rounded anteriorly, and tapers to a narrow truncate posterior end. The figured specimens measure 0.59 and 0.64 mm. in length. Along the inner margin a series of fourteen to sixteen triangular shaped backward directed denticles extends nearly the full length of the jaw. The first six or seven denticles are sharp-pointed while the remaining ones are blunt. In the anterior third of the jaw, adjoining or bordering upon the above described teeth, is a small jaw or a group of minute denticles arranged in a small arc. There is a deep cavity between the two rows of adjacent denticles. This second row of denticles is probably a separate jaw closely articulated to the larger one. It is difficult to find, however, a suture or line of articulation between the two jaws. The upper side of the jaw is completely occupied by a fossa. The margins of the fossa are slightly thickened at the anterior end. The under side of the jaw is highly convex.

A number of specimens were found in this deposit having more than one row of denticles. The deep cavity between the row of denticles suggests that the form is made up of two separate jaws which must have been closely articulated during life. It is not an accident of preservation since several specimens were found. In outline and other characteristics the form resembles very closely *S. nettingi* except for the size and arrangement of the denticles.

Occurrence: The figured specimens are from the Rockland at Kirkfield, Ontario, and the Middle Trenton near Three Rivers, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,428; also a paratype, number 25,489.

***Staurocephalites kayi* sp. nov.**

Maxilla II, plate IV, figs. 10, 11.

The jaw is small, elongate, and its long axis is slightly curved. On the the inner margin a series of ten sharp, conical shaped, backward directed denticles extends to the posterior end. The first denticle is slightly larger and appears, when viewed from the side, to be a continuation of the margins. A slightly flattened or concave area is formed just posterior to the first denticle or fang. The anterior end of the jaw is wide to a point about midway where it narrows abruptly and terminates in an acute posterior

extremity. The margins are usually broken but have a tendency to be slightly thickened. A large wide fossa occupies the complete upper surface of the jaw and is deep in the center toward the denticles but shallow and flattened at the margins. The length of the average jaw is 0.32 mm.

There is a slight similarity between *Staurocephalites dentatus* Stauffer (1933) and *S. kayi* in the anterior area but in most characteristics they differ. A specimen described by Stauffer (1939) from the Olentangy shale, Marsh's Mill, Ontario, as *Lumbriconereites* sp. (fig. 5) is similar to *S. kayi* in a general way but differs in the width of the jaw, the number of denticles, and the anterior ends.

Occurrence: The figured specimen is from a small quarry about four miles north of Peterborough. This form was also found at Paquette Rapids, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,151.

***Staurocephalites aduncus* sp. nov.**

Maxilla II, plate IV, figs. 12, 13.

The jaw is wide and rounded anteriorly and narrows abruptly to an acute posterior end. A typical specimen measures 0.56 mm. in length. Eight large, conical, sharp-pointed, backward directed denticles extend to the posterior extremity. The first two denticles are small but they increase in size to the mid-area and then decrease slightly in size to the posterior end. The margin bearing the denticles curves at the anterior end and forms a concave area on the inside of the curve. The under side is convex. A large, deep fossa occupies the upper side of the jaw. The margins of the fossa are only slightly thickened.

Ænonites excavatus Eller (1941) is similar to *Staurocephalites aduncus* except for the denticles and the depth of the fossa and the character of the margins around the fossa.

Occurrence: The figured specimen is from a small quarry, considered to be Rockland, near Millington, Ontario County, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,267.

***Staurocephalites (?) arcus* sp. nov.**

Maxilla III, plate IV, figs. 14, 15.

In comparison with the size of denticles the jaw is narrow and short. The described specimens measure 0.48 mm. and 0.64 mm. in length. A series of twelve to fifteen sharp, conical, backward directed denticles ex-

tends the full length of the jaw. The denticles are slightly hooked. At the anterior end the denticles are small and increase gradually to a large size at the mid-area, then decrease to the posterior end; the last three denticles are minute. One side of the jaw is flattened and the opposite side is convex. The margins of the sides of the jaw or fossa are incurved and thickened. A narrow, deep fossa occupies the upper side of the jaw.

Eunicites validus Eller (1938) is similar to *Staurocephalites* ? *arcus* in a general way. The margins and denticles differ in the two species. *Lumbriconereites arcuatus* Stauffer (1933) resembles closely *Staurocephalites arcus*. The two forms differ in the character of the denticles and the shape of the anterior ends.

Occurrence: *Staurocephalites* ? *arcus* was found in the Rockland at Lakefield, Ontario, in the Upper Cobourg at Collingwood, Ontario, and in the Middle Trenton at Three Rivers, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,293; also a paratype, number 25,540.

***Staurocephalites admirabilis* sp. nov.**

Maxilla II, plate IV, figs. 16-18.

In size the jaw is large, measuring probably 2 mm. in length. A specimen (fig. 16) is 0.99 mm. Along the inner margin a series of twenty-five long, conical, sharp-pointed, backward directed denticles extends to the posterior extremity. The first few denticles are smaller than those of the mid-area, which are uniform in size. In the posterior third the inner margin curves outward and the denticles increase in length, and then decrease rapidly in size to the posterior end. Most of the denticles are slightly hooked. The denticles, at their base, continue into the lower surface of the jaw as ridges. From the upper side these ridges are visible through the thin jaw as furrows. This gives the side of the jaw a corrugated appearance. The areas on both sides of the denticles are flattened or slightly concave. The anterior end of the jaw is rounded and the posterior end is pointed. A wide, shallow fossa occupies nearly the complete upper side of the jaw. The margin of the fossa is thickened and rounded.

Except in a general way there is not enough similarity between this species and others of the genus to warrant comparisons.

Occurrence: *Staurocephalites admirabilis* was found only in the Cobourg at Collingwood, Ontario, and in the Rockland at Kirkfield, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,323; likewise a paratype, number 25,324.

Staurocephalites ? absimilis sp. nov.

Maxilla II or III, plate IV, figs. 19, 20.

The jaw is long, narrow, and measures 0.59 mm. in length. Along the curved inner margin a series of fifteen long, conical and sharp-pointed denticles extends the full length of the jaw. The first four or five denticles are longer than the width of the jaw. The remaining denticles are smaller and wider at the base. They decrease in size gradually to the posterior end. For the most part the denticles are perpendicular to the inner margin of the jaw. The anterior margin is blunt and the lateral irregularly curved margins taper to an acute posterior extremity. A fossa occupies the complete upper surface of the jaw. The margins of the fossa are thin.

The species does not resemble other forms very closely. *Staurocephalites serrula* Hinde (1880) is similar in a general way to *S. absimilis*.

Occurrence: The form was found in the Rockland at Lakefield, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,354.

Staurocephalites bijugus sp. nov.

Maxilla II, plate IV, figs. 21-23.

The jaw apparatus consists of two parallel rows of denticles of equal length. The denticles of both rows are sharp-pointed, backward directed, and equal in number. The anterior end is rounded while the posterior end is slightly truncate. A fossa extends the full length of the upper side. When the form is observed from the under side there is a faint trace of articulation but it cannot be definitely described or illustrated. There is no line of articulation visible from the upper side in the fossa. The jaw measures 0.52 mm. in length.

This form is probably made up of two jaws that have become so closely adhered to each other that any seam between them is difficult to detect. It is interesting to note that there is no partition in the fossa.

Occurrence: The figured specimen is from the Middle Trenton at the St. Maurice Quarry north of Three Rivers, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,500.

Staurocephalites cuneiformis sp. nov.

Maxilla III, plate IV, fig. 24.

The jaw is small, rounded or blunt anteriorly, and tapers to an acute posterior end. The figured specimen measures 0.35 mm. in length. Along the straight inner margin a series of five or six conical, sharp-pointed,

backward directed denticles extends the full length of the jaw. The first denticle is slightly larger than the remaining denticles and is situated some distance from the anterior margin. All the denticles are large for the size of the jaw. The area around the first denticle is somewhat concave or flattened. A fossa occupies the upper side of the jaw. The margins of the fossa are thin and usually broken.

Staurocephalites cuneiformis resembles in a general way *S. aduncus* and *S. agriodos* described in this paper.

Occurrence: The form was found in the Selby of the Rockland at Lowville, New York, and in the Rockland at Belleville, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,355.

***Staurocephalites absis* sp. nov.**

Maxilla III, plate IV, fig. 25.

The jaw is short and wide with broadly rounded ends. A series of nine large, conical, sharp-pointed denticles extends the complete length of the jaw. The first denticle is small and they increase in size to the mid-area, where they become smaller, to the posterior extremity. The denticles are arranged in a curved arc. The surface adjacent to the inside of the arc is slightly concave; the opposite side is convex. A deep, narrow fossa extends the full length of the upper side. Its margins are thickened and rounded. A described specimen is 0.56 mm. in length.

Staurocephalites absis is similar to *Eunicites validus* Eller (1938) in a general way. The two species differ in the curvature of the arc and the size of the denticles. The areas on both sides of *Eunicites validus* are convex while the inner side of *Staurocephalites absis* is concave. Except for the length and number of denticles, *Lumbriconereites arcuatus* Stauffer (1933) is like *Staurocephalites absis*.

Occurrence: Along the Pretty River, east of Collingwood at Georgian Bay, Ontario, the Cobourg crops out. The limestone is thin bedded, argillaceous, rubblely, and weathers gray. Jaws were plentiful at this locality. The form was also found in the Cobourg at Cobourg, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,164.

***Staurocephalites ? triplus* sp. nov.**

Maxilla II, plate IV, figs. 26-28.

The jaw is narrow and elongate with three separate rows of denticles. A series of nineteen sharp, conical, backward directed denticles extends the

full length of the jaw. The anterior denticles are large but decrease suddenly in size at the posterior end. In the anterior half of the jaw a second series of sharp, conical denticles, parallel to the principal row, extends nearly to the mid-point. These denticles are on the left-hand side of the jaw when it is observed from the under side. On the right side, at the posterior end, a highly arched ridge bearing a series of thirteen sharp, minute denticles extends to the end of the jaw. Both the anterior and posterior ends are truncate. A shallow fossa is present the full length of the upper surface. The described specimen is 0.75 mm. in length. No definite suture of articulation is noticeable between the rows of denticles on either the upper or under sides of the jaw.

It is probable that this form is made up of three different segments of jaws very closely articulated. The second row of denticles at the anterior end of the jaw is quite conceivable when one considers the arrangement of the jaw apparatus in some of the modern forms. The row of denticles or small attached jaw at the posterior third is not so easily explained or imagined. It is interesting to note the similarity of the two rows of denticles in the posterior end.

Occurrence: The described specimen came from a quarry two miles north of Belleville, on the road to Foxboro, Ontario. The dark limestone in the quarry is probably Rockland in age. It is about ten feet thick and rests on shale.

Type: The holotype is in the Carnegie Museum, number 25,212.

***Staurocephalites agriodos* sp. nov.**

Maxilla III, plate IV, figs. 29, 30.

The jaw is elongate, obliquely truncate at the anterior end, and tapers to an acute posterior extremity. The figured specimen measures 0.54 mm. in length. Along the inner margin, a series of sharp-pointed, conical denticles extends the full length of the jaw. The first denticle is very large and slightly hooked. The next four denticles are large and of nearly the same size. The remaining denticles are very small. All denticles point in a backward direction. The outer margins are incurved while the inner margin bearing the denticles is arched. A fossa occupies the complete upper surface of the jaw. The margins of the fossa are thickened and rounded.

There is a slight resemblance between *Staurocephalites agriodos* and *S. aduncus*. *Enonites excavatus* Eller (1941) is similar to *S. agriodos* except for the shape of the anterior end and the character of the denticles.

Occurrence: The figured specimen is from the Rockland at Kirkfield, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,353.

***Staurocephalites nettingi* sp. nov.**

Maxilla II, plate IV, fig. 31.

The jaw is long, wide anteriorly, narrow posteriorly and measures from 0.64 mm. to 1.21 mm. in length. A series of from eighteen to twenty-one denticles extends along the inner margin to the posterior extremity. The first seven or more denticles are sharp, conical and backward directed. They extend to just beyond the mid-point. The remaining denticles rapidly become small or minute. Toward the posterior end they are rather blunt and uniform in size. The margins are irregular and thin. In some specimens the margins were translucent. The anterior margin is usually broadly curved but may be straight and obliquely truncate to the outer margin. The posterior end is narrow and rounded. The left outer margin is parallel to the margin bearing the denticles. A large, deep fossa, wide anteriorly, narrow posteriorly, extends the complete length of the jaw. The under side is convex except at the anterior end, which is flattened or may be slightly concave.

Staurocephalites nettingi is similar to other species of this genus only in a general way. This species is one of the most common in the fauna. The abrupt change from the large denticles to the very small ones is apparent in nearly every specimen.

Occurrence: *Staurocephalites nettingi* was found only in the Rockland. It is very common at Lakefield, Ontario, and occurs from Millington, Ontario, to Lowville, New York. This species was also found at Paquette Rapids, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,309. Paratypes are in the collections of Princeton University and the Royal Ontario Museum of Paleontology.

***Staurocephalites mierowae* sp. nov.**

Maxilla II, plate IV, figs. 32, 33.

The jaw is elongate, irregular in outline, and measures 0.52 mm. in length. On the inner margin a series of fourteen large, conical, sharply-

pointed denticles extends the full length of the jaw. The denticles are nearly uniform in size and are perpendicular to the margin, except at the posterior end where the last three or four denticles are bent backwards. The first denticle is slightly larger, especially at the base. The anterior and posterior ends are both acute. The outer margins are broken but there is evidence that they were slightly thickened. A deep but narrow fossa extends the full length of the upper side of the jaw.

This species is not closely similar to any other form. The uniformly large denticles, especially the posterior ones, are a contrast to most species of this genus.

Occurrence: The figured specimen is from the quarry of the Canada Cement Company at Lakefield, Ontario. The age is probably Rockland.

Type: The holotype is in the Carnegie Museum, number 25,199.

***Staurocephalites heppenstallae* sp. nov.**

Maxilla II, plate IV, figs. 34, 35.

The jaw is narrow, elongate, and slightly curved along its horizontal axis. Measurement of the length of the figured specimen is 0.43 mm. A curved inner margin bears a series of eight sharp, conical, backward directed denticles and six or more round, minute ones which extend nearly to the posterior end. The anterior end of the jaw is obliquely truncate and forms an acute point. The outer margins are curved and a small indentation is present at the anterior end. The margins are slightly thickened. The under surface is generally convex but shallow concave areas are present near the denticles and especially at the anterior part. A large deep fossa, wide anteriorly and narrow posteriorly, is present along the complete length of the upper side of the jaw. The posterior end is rounded.

Staurocephalites heppenstallae is quite similar to *S. dentatus* Stauffer (1933), fig. 32, especially at the anterior part. The denticles in the posterior area are different. It is difficult to draw any additional conclusions since only one view of *S. dentatus* Stauffer is shown.

Occurrence: The figured specimen is from the Hull at Hull, Quebec. The form was common from the Cobourg at Collingwood to the Selby of Rockland age at Lowville, New York.

Types: The holotype is in the Carnegie Museum, number 25,145. Paratypes are in Princeton University and the Royal Ontario Museum of Paleontology.

***Staurocephalites paquetensis* sp. nov.**

Maxilla II, plate IV, figs. 36-38.

The jaw is elongate, wide anteriorly and narrowing abruptly at the mid-point. The posterior end is truncate. A complete specimen measured 1.37 mm. in length, while a broken one probably measured 1.5 mm. Along the inner margin a series of from fourteen to twenty sharp, triangular shaped, backward directed denticles extends to the posterior extremity. The first denticle and sometimes the second one are parallel with the broad anterior margin. The second denticle is usually smaller than the first or third denticle. From the anterior to the posterior end the denticles decrease in size uniformly. The left outer margin is parallel to the row of denticles. The right outer margin is incurved at about the mid-area. A large fossa occupies the complete upper side of the jaw. The margins of the fossa are thin and irregular.

Staurocephalites nettingi is similar to *S. paquetensis*. They differ in the size and arrangement of the denticles and the width of the anterior end. *S. paquetensis* resembles *S. externus* Eller (1944) except for the width of the anterior end.

Occurrence: The figured specimens are from the Rockland at Paquette Rapids, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,636; also a paratype, number 25,637.

***Staurocephalites mcallae* sp. nov.**

Maxilla II, plate VII, fig. 24.

The jaw is elongate and measures 1.53 mm. in length. On the lower surface a series of seventeen large, sharp, conical, backward directed denticles extends to the posterior end. The first denticle is smaller and parallel to the anterior margin and second denticle. From the anterior end the denticles increase in size slightly to about the mid-point and then decrease in size gradually to the very small ones at the posterior extremity. The anterior end is narrow but truncate. The posterior end is broadly rounded. Both margins are thin and broken. The fossa extends the full length of the jaw and is narrow and deep.

An additional characteristic of the genus *Staurocephalites* is the tendency of the margin bearing the denticles to curve at the anterior end. In *Staurocephalites mcallae*, only one denticle is out of alignment with the others, but in many species several may be.

Occurrence: About three miles north of Lindsay, Ontario, the highway, route 35, cuts an escarpment and exposes from ten to fifteen feet of thin bedded limestone which is perhaps Rockland in age.

Type: The holotype is in the Carnegie Museum, number 25,155.

Genus *ÆNONITES*, Hinde, 1879

***Ænonites adversus* sp. nov.**

Maxilla II, plate V, fig. 1.

The jaw is small, wide anteriorly, and tapers to a narrow posterior end. In length, the figured specimen measures 0.48 mm. A series of about twenty sharp-pointed, conical denticles extends the full length of the jaw. The first two denticles are large and point forwards. The remaining denticles are minute and point in a backward direction. At about the mid-point, the denticles reverse their position and are directed toward the outer side. A small, narrow fossa is present in the posterior half of the jaw. The margins of the fossa are rounded. The under side of the jaw is convex while the upper side is flattened or slightly concave.

In some characters this species might be placed under the genus *Ildraites*. It does not, however, have the typical flange, deep indentation on the outer margin, or a typical fossa. *Ildraites exquisitus* Eller and *I. fritzae* Eller (1942) are forms that suggest the relationship to *Ildraites*. *Ænonites parvidentatus* Eller (1940) is similar to *Æ. adversus* in outline. *Æ. curvidens* Hinde (1882), fig. 32, resembles *Æ. adversus* rather closely except for the character and arrangement of the denticles.

Occurrence: The figured specimen is from the Upper Cobourg at the eastern part of Collingwood, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,372.

***Ænonites ? intrinsecus* sp. nov.**

Maxilla II, plate V, fig. 2.

The jaw is small, wide anteriorly, and tapers to a blunt posterior. The figured specimen measures 0.35 mm. in length. A series of ten sharp-pointed, conical, slightly hooked denticles extends nearly to the posterior end. The inner margin bearing the denticles is slightly incurved. The first denticle is a little larger than the other denticles and it appears to be a continuation of a ridge that extends the full length of the jaw. The area between the denticles and the ridge is concave. All the denticles point slightly backwards and are nearly uniform in size. A narrow fossa ex-

tends the full length of the jaw. The margin of the fossa is thin and may be broken. The under side is convex and is extended beyond the outer margin of the upper side.

The shape of the fossa is not like most forms of *Ænonites*. There is a slight resemblance between *Æ. intrinsecus* and *Æ. henryi*. Hinde (1882) described a number of specimens as *Æ. naviformis* that are similar to *Æ. intrinsecus* in a general way.

Occurrence: The figured specimen is from the Rockland at Dalrymple, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,358.

***Ænonites fissilis* sp. nov.**

Maxilla I, plate V, figs. 3, 4.

The jaw is small, narrow and elongate. It measures from 0.52 mm. to 0.72 mm. in length. A series of eight to twelve small, sharp-pointed, conical denticles extends about two-thirds the length of the jaw. The fang is long, sharp and slightly angular. The first two or three denticles are small and point in a forward direction. The remaining denticles are backward directed and decrease gradually in size to the posterior end. A deep fossa begins opposite the first denticle and extends to the end of the jaw. The margins of the fossa are thickened and rounded. The upper side of the jaw is slightly concave adjacent to the denticles. The under side is irregularly concave and convex. Near the posterior end a small notch is present that is emphasized by a groove that extends for a short distance parallel to the sides of the jaw.

Ænonites franci Eller (1940) very slightly resembles *Æ. fissilis*. There is a similarity between *Æ. sinuatus* Eller (1942) and *Æ. fissilis*. The two forms differ in the length of the fang and the shape of the fossa. Except for the arrangement of denticles, *Æ. serratus* Hinde (1879) is similar to *Æ. fissilis*.

Occurrence: The species occurs generally through the Trenton and has wide geographical distribution.

Type: The holotype is in the Carnegie Museum, number 25,282.

***Ænonites ? dubius* sp. nov.**

Maxilla II or III, plate V, figs. 5, 6.

The jaw is triangular in shape, wide anteriorly, and tapers to an acute posterior extremity. The figured specimen measures 0.39 mm. in length.

On the inner margin, a series of eight blunt, elongate denticles extends the full length of the jaw. The first denticle is the largest and the remaining teeth decrease in size gradually to the posterior end. One outer margin is thin and broken while the other is extended to a blunt point at about the mid-area. The anterior margin is straight or slightly incurved. A large shallow fossa occupies nearly all of the upper side of the jaw. The margin of the fossa nearest the denticles is flat, wide, and slightly thickened. The underside of the jaw is convex except for the flattened area adjacent to the denticles.

When this species is observed from the upper side it resembles species of the genus *Leodicites*. The underside, bearing the denticles, is not like that of any species of *Leodicites*. The form does not, however, fit very well in the genus *Ænonites*. In 1940, the writer described *Ænonites triangulus* which is in a general way slightly similar to *Æ. dubius*.

Occurrence: The form was common in the Rockland at Kirkfield, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,375.

***Ænonites bittingsae* sp. nov.**

Maxilla I, plate V, fig. 7.

The jaw is elongate, wide anteriorly, and tapers to an acute posterior extremity. The figured specimen measures 0.38 mm. in length. On the inner margin a series of fourteen small, sharp-pointed, conical, backward directed denticles extends nearly the full length of the jaw. The fang is slightly larger than the second denticle. The denticles decrease in size gradually to the posterior end. The anterior margin is rounded to a nearly straight outer margin. A large deep fossa extends nearly the full length of the jaw. One margin of the fossa is extended in to a small shank at the posterior end. The upper surface of the jaw is convex while the under side is flattened.

Ænonites bittingsae is similar to *Æ. dignus* Stauffer (1933) when viewed from the under side. The denticles of the two forms differ in character. Except for the arrangement of the denticles, *Æ. exactus* Eller (1940) resembles *Æ. bittingsae* quite closely. Hinde (1879) described a form *Æ. amplus* from the Clinton of Ontario (probably from the Cataract formation) that resembles *Æ. bittingsae* when viewed from the under side. Some of the figured specimens of *Æ. naviformis* Hinde (1880, 1882) are similar to *Æ. bittingsae*.

Occurrence: The figured specimen is from a small quarry near Millington, Ontario County, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,268.

***Ænonites coggeshalli* sp. nov.**

Maxilla II, plate V, figs. 8-11.

The jaw is elongate and measures from 0.59 mm. to 1.29 mm. in length. A series of fifteen or sixteen sharp-pointed, conical denticles extends the full length of the jaw. The first denticle is larger and more hooked than the other denticles. The next two denticles are usually small and are followed by larger ones which decrease gradually in size to the posterior end. All denticles are pointed in a backward direction. On the outer margin in the anterior part of the jaw a long, narrow flange is present. The flange is thin and usually broken. An irregularly shaped fossa extends the full length of the jaw. The margin of fossa opposite the flange is thickened and rounded.

Ænonites coggeshalli is similar in a general way to *Æ. cadwaladeri* Eller (1941) and, perhaps, *Æ. grandidentatus* Eller (1934).

Occurrence: The figured specimens are from the Rockland near Lindsay, Ontario, and from the Cobourg at Collingwood, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,208; also a paratype, number 25,209. A paratype is also in the collection of Princeton University.

***Ænonites impardentatus* sp. nov.**

Maxilla II, plate V, figs. 12, 13.

The jaw is small, wide anteriorly, and tapers to a blunt posterior end. In length the figured specimen measures 0.38 mm. Along the inner margin a series of sharp-pointed, conical, backward directed denticles of various sizes extends nearly the full length of the jaw. The first denticle is medium in size and is followed by a minute one. The third denticle is the largest and it is followed by three slightly smaller teeth. The remaining denticles are minute. The outer margin on the upper side is notched at the anterior end while the margin on the under side is extended into a small shank-like projection. A narrow fossa occupies the upper side of the jaw. The margins of the fossa are slightly thickened. The upper and lower sides of the jaw are irregularly convex and with flattened areas.

There is a slight resemblance between *Ænonites coggeshalli* and *Æ. imparidentatus*. The two forms differ mostly in the type and arrangement of the denticles and in length.

Occurrence: This form was found in the Cobourg at Port Hope, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,365.

***Ænonites bidwelli* sp. nov.**

Maxilla I, plate V, fig. 14.

The jaw is elongate, narrow at the anterior and posterior ends, and wide at the mid-point. The figured specimen measures 0.59 mm. in length. Along the straight inner margin a series of sixteen small, sharp-pointed, conical denticles extends the full length of the jaw. The fang is only slightly larger than the denticles following. The first three or four denticles, including the fang, point in a forward direction. The remaining denticles decrease in size gradually to the posterior end and are all pointed in a backward direction. A large, deep fossa occupies about two-thirds of the upper side of the jaw. The margins of the fossa are slightly thickened and rounded, except at the posterior end of the inner margin which is wide and flattened.

There is a slight similarity between *Æ. orthodontes* Eller (1939) and *Æ. bidwelli*. *Æ. orthodontes* is wider anteriorly and its denticles do not extend to the posterior end. *Æ. crepitus* Eller (1942) resembles *Æ. bidwelli* quite closely but the fang, denticles, and outer margin do not correspond. Hinde (1879) described three specimens of *Eunicites varians* (Grinnell) from the Cincinnati Group of Ontario and a form *Ænonites amplius* Hinde that have characteristics slightly similar to those of *Æ. bidwelli*. Hinde (1882) figured several specimens of *Ænonites naviformis*, some of which are quite like *Æ. bidwelli*. Searight (1923, fig. 1) illustrated a form, but did not describe it, that resembles *Æ. bidwelli* quite closely. In 1933, Stauffer described three similar forms, *Æ. tacitus*, *Æ. dignus*, and *Æ. inornatus* that slightly resemble *Æ. bidwelli*.

Occurrence: Several specimens of this species were found in the Rockland at Kirkfield and at Napanee in Ontario, and at the intersection of the highways along West Canada Creek, two miles northwest of Poland, New York.

Type: The holotype is in the Carnegie Museum, number 25,301.

Genus PALEÆNONITES, Eller, 1942

Paleœnonites acutus sp. nov.

Maxilla II, plate V, figs. 15, 16.

In outline, the jaw is triangular, wide anteriorly, and the lateral margins taper to an acute posterior extremity. Along the inner margin a series of twelve to sixteen sharp to blunt, conical denticles extends the full length of the jaw. The anterior denticles are small and point forward, while the posterior ones increase gradually in size and point backward. The first denticle or fang is slightly larger and is a continuation of the thickened anterior margin. Specimens measure from 0.56 mm. to 1.13 mm. in length. The anterior margin is slightly incurved and forms a small shank with the gently curved outer margin. On the upper surface a narrow fossa extends from the shank to the posterior end. The margins of the fossa are thickened and well rounded. The under surface of the jaw is convex, while the area between the fossa and the denticles is concave or flattened.

Paleœnonites acutus is similar to *P. latissimus* Eller (1942) except for the width of the jaw, size of the shank, and arrangement of the denticles. *Ænonites kopfi* and *Æ. fornicatus* Eller (1940) resemble *P. acutus* quite closely. They differ from each other in the character and shape of the margins and the fossa and the arrangement of the denticles. *Ænonites radula* Hinde (1882) from the Silurian of Gotland is like *P. acutus* in outline, but the shape and position of the fossa differ.

Occurrence: The species is found in the Rockland at Lindsay, Lakefield, and Kirkfield, and from the Denmark of the Sherman Fall at Copenhagen, New York.

Types. The holotype is in the Carnegie Museum, number 25,201. Paratypes have been deposited in the Royal Ontario Museum of Paleontology and in Princeton University.

Paleœnonites dillae sp. nov.

Maxilla II, plate V, figs. 17-20.

The jaw is triangular in outline and measures from 0.38 mm. to 0.99 mm. in length. Along the straight inner margin a series of from six to eleven conical, sharp-pointed denticles extends only about two-thirds the

length of the jaw. The small, forward-pointing fang is emphasized by a wide and thickened anterior margin present in the upper side of the jaw. Except for the fang, all other denticles point backward and increase in size posteriorly. The inner margin posterior to the denticles is thickened. The anterior margin is rounded near the fang and then incurves deeply, to form a narrow, forward-pointing shank with the straight outer margin. The posterior end is truncate and slightly incurved. On the upper surface a narrow fossa extends nearly the full length of the jaw. The inner margin of the fossa is thickened and rounded. The under surface of the jaw is generally convex, but may be flattened or slightly concave adjacent to the inner margin and posterior to the denticles. The upper margin is concave between the inner margin of the fossa and the denticles.

The general outline of *P. dillae* is somewhat similar to that of *P. accuratus* Eller (1942). They differ in the arrangement of the denticles, characters of the fossa, and in the size of the shank. Except for the character of the denticles and surface features, *Arabellites erectus* Stauffer (1933) resembles *P. dillae* in general shape.

Occurrence: This form was present throughout the Trenton and was found at nearly every locality from Craigeleith, Ontario, to Watertown, New York.

Types: The holotype is in the Carnegie Museum, number 25,333; also a paratype, number 25,335. Paratypes have also been deposited in the Royal Ontario Museum of Paleontology and in Princeton University.

***Paleænonites castigatus* sp. nov.**

Maxilla II, plate V, figs. 21-24.

The jaw is narrowly triangular in shape and measures from 0.43 mm. to 0.52 mm. in length. On the outer margin a series of eight to fourteen conical, sharp-pointed, backward-directed denticles extends nearly to the posterior end. The fang is a little larger than the other anterior denticles. From the anterior to the posterior the denticles increase slightly in size. The wide anterior margin is well rounded adjacent to the fang, but incurves slightly to form a very small shank. The outer margin is slightly curved and the inner margin is nearly straight. The jaw tapers to an acute posterior extremity. On the upper side of the jaw a fossa occupies about half the width of the jaw and extends nearly its full length. The margins of the fossa are thickened and rounded. The underside is convex, while the

narrow area between the fossa and the denticles on the underside is concave.

Except for the width and character of the denticles, *Paleænonites castigatus* is similar to *Paleænonites davisæ*. *Ænonites kopfi* and *Ænonites fornicatus* Eller (1940) resemble *Paleænonites castigatus* except for the width of the jaw and the character of the fossa. *Ænonites radula* Hinde (1882) resembles *Paleænonites castigatus* in a general way but differs in the width of the jaw and the character of the denticles.

Occurrence: *Paleænonites castigatus* was found only in the Rockland, and the figured specimens are from Lindsay, Ontario, and Dexter, New York.

Type: The holotype is in the Carnegie Museum, number 25,234; also a paratype, number 25,235.

***Paleænonites henryi* sp. nov.**

Maxilla II, plate V, figs. 25, 26.

The jaw is subtriangular in outline and measures from 0.43 mm. to 0.52 mm. in length. Along the inner margin a series of from nine to eleven conical, sharp-pointed, backward directed denticles extends nearly to the posterior end. The fang is only slightly larger than the denticles and appears to be a continuation of the rounded anterior margin. Beginning at the anterior, the denticles gradually increase in size to the mid-area and then become smaller to the posterior end. The outer margin is rounded and extended. A narrow fossa extends nearly the full length of the jaw. The margin on the upper side of the fossa is thickened and rounded. The under side of the jaw is highly convex while the upper side is concave.

This form is somewhat similar to *Ænonites alpenaensis* Eller (1938), except for the size and arrangement of the denticles. There is a slight resemblance between *Ænonites radula* Hinde (1882) and *P. henryi*. The outer and anterior margins and the denticles of the two forms differ in their details. There is a general similarity between *P. henryi* and *P. davisæ*.

Occurrence: *Paleænonites henryi* was found in the Rockland at Lindsay and at Lakefield, Ontario. It was especially common at the Lindsay locality.

Types: The holotype is in the Carnegie Museum, number 25,143. Paratypes are in Princeton University and the Royal Ontario Museum of Paleontology.

***Paleœnonites pennatus* sp. nov.**

Maxilla II, plate V, figs. 27, 28.

The jaw is wide and the anterior end is extended. A typical specimen measures 0.54 mm. in length. Along the nearly straight inner margin a series of eleven irregularly shaped denticles extends the full length of the jaw. The fang is long, sharp, and directed forward. The following five or six denticles are small, sharp-pointed, and are both forward and backward directed. The remaining denticles are much larger, blunt, and point in a forward direction. The outer margin is mostly a wide truncate shank formed by a slight incurving of the wide anterior and posterior margins. On the upper surface a wide, deep fossa occupies about one-half of the area. The anterior and inner margins of the fossa are thickened and rounded. The inner margin posterior to the denticles and the inner margin of the fossa converge to form an acute posterior extremity. The under side of the jaw is convex except for the area adjacent to the shank. The upper side is irregularly convex.

Except for some general features, this form is unlike other species of the genus. It is rather rare in the fauna. *Paleœnonites parallelus* Eller (1943) has a similar wide, truncate shank but differs in other characters.

Occurrence: The figured specimen is from the Rockland near Lindsay, Ontario. Other specimens were found at Rockland, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,272.

***Paleœnonites clinatus* sp. nov.**

Maxilla II, plate V, figs. 29-32.

The jaw is large, subtriangular in outline, wide anteriorly and tapers rapidly to an acute posterior end. The figured specimens measure from 0.75 mm. to 1.1 mm. in length. The width of the jaws, although the outer margins are broken, measure from 0.71 mm. to 0.75 mm. Other specimens are as long as 1.6 mm. Along the inclined or curved inner margin a series of about nine to twelve blunt, conical denticles extends the full length of the jaw. The first three denticles are directed backwards while the remaining ones are perpendicular to the long axis or length of the jaw. The denticles decrease in size uniformly from the large anterior teeth to the small ones at the posterior end. The outer margin on the upper side is irregular and usually broken. It forms a large shank

with the curved anterior margin. A long narrow fossa occupies the anterior end of the jaw and extends to the posterior extremity. Part of the anterior margin and one of the lateral margins of the fossa is thickened and rounded. The under side of the jaw is concave while the upper side is convex.

There is a slight resemblance between *Paleænonites clinatus* and *Enonites fornicatus* Eller (1940) and *Paleænonites latissimus* Eller (1942). The species differ in the shape of the fossa and the position of the denticles. *Paleænonites davisæ*, described in this paper, is similar to *P. clinatus* except for the size and position of the denticles. The fossa of both forms extends well to the anterior of the jaw.

Occurrence: The figured specimens are from the Rockland at Kirkfield, Ontario, and Middle Trenton at Three Rivers, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,414; also paratypes, numbers 25,463-4.

***Paleænonites frickei* sp. nov.**

Maxilla II, plate V, figs. 33, 34.

The jaw is small, irregularly rectangular in outline, and the figured specimen measures 0.24 mm. in length. A series of twelve small, blunt denticles extends nearly to the posterior end. The first denticle or fang is slightly larger and points in a forward direction. The second and often the third denticle are directed forward, but the remaining ones are nearly perpendicular to the straight inner margin. They do not noticeably decrease in size to the posterior end. The anterior of the jaw is sharply incurved from the fang and extends into a heavy shank. The outer margin is straight, while the posterior margin is broadly rounded. The under side is irregularly convex, except for a triangular area which is concave. A long, narrow fossa occupies most of the upper side of the jaw. The margin of the fossa, except that which makes up part of the shank, is thickened and rounded. The upper side is flattened or slightly concave between the thickened margin and the denticles.

Although this species conforms well with this genus it does not resemble any other species closely enough to warrant comparisons.

Occurrence: *P. frickei* was found in the Upper Cobourg at Collingwood, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,266.

***Paleœnonites comptus* sp. nov.**

Maxilla II, plate V, figs. 35, 36.

The jaw is rectangular in outline, nearly as wide posteriorly as anteriorly, and the figured specimens measure 0.54 mm. in length. Slightly adjacent to the inner margin a series of twelve small, blunt denticles extends about two-thirds the length of the jaw. The fang is a little larger than the other anterior denticles and is strengthened by a thickened anterior margin developed on the upper side of the jaw. The anterior denticles point forward, while the posterior ones point backwards and increase in size. Following the last denticle, a thick, rounded ridge is present which curves around the posterior end and is present for a short distance adjacent to the outer margin. The anterior margin is notched by a deep crescent-shaped bight, which forms a narrow, curved, forward directed shank with the slightly curved outer margin. The posterior margin is widely truncate. On the upper side of the jaw a wide fossa is present. The margin of the fossa is thickened, especially at the posterior end. The under side of the jaw is convex except at the posterior end adjacent to the denticles and the ridge. The upper side is mostly convex except for the area near the fang.

There is a general resemblance between *P. comptus* and *P. dillae*. The two species differ in the shape of the fossa and the character of the posterior end. *Paleœnonites accuratus* Eller (1942) has a ridge posterior to the denticles similar to *P. comptus*. The two species, however, differ in several other respects.

Occurrence: Scolecodonts are very common at a small quarry in the west end of Collingwood, Ontario, where what is probably Upper Cobourg limestone is exposed.

Type: The holotype is in the Carnegie Museum, number 25,176.

***Paleœnonites davisae* sp. nov.**

Maxilla II, plate V, figs. 37, 38.

The jaw is triangular in outline and the outer and inner margins form an acute posterior extremity. All specimens measured about 0.52 mm. in length. On the inner margin a series of ten or eleven small, conical denticles extends and decreases in size to the posterior end. The fang is considerably larger than the rest of the denticles and seems to be a con-

tinuation of the outer and anterior margins. The outer margin is straight and forms a broad shank with the anterior margin. A large fossa occupies all the upper side of the jaw. It is surrounded by a thickened margin. The under side of the jaw is concave but the opposite side is convex, especially near the rounded margin.

In a general way, *Paleænonites latissimus* Eller (1942) is similar to *P. davisæ*. *Enonites alpenaensis* Eller (1938) resembles *P. davisæ* except for the shape of the fossa and the character of the denticles. *Enonites radula* Hinde (1882), from the Silurian of Gotland, resembles *P. davisæ* in a general way but differs in the shape of the anterior margin and fossa.

Occurrence: The figured specimen is from the Rockland about two miles north of Lindsay, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,246. Paratypes have been sent to Princeton University and the Royal Ontario Museum of Paleontology.

***Paleænonites circumscriptus* sp. nov.**

Maxilla II, plate V, figs. 39-42.

The jaw is narrow and tapers to an acute, elongate anterior end. A typical specimen measures 0.54 mm. in length. Along the straight inner margin a series of twelve conical, sharp to blunt denticles extends for about three-quarters the length of the jaw. The denticles on the anterior half of the jaw point forward, while those on the posterior half point backward. The denticles increase slightly in size posteriorly. The fang is a little larger than the anterior denticles and is emphasized by a ridge along the anterior margin on the upper side of the jaw. The anterior and outer margins are nearly straight but form a short, blunt shank. The posterior end is narrow and is notched by small indentations. A shallow fossa occupies part of the upper surface of the jaw. The margins of the fossa, especially the inner one, are thickened and rounded. The under surface is irregularly convex, while the upper surface is concave between the margin of the fossa and the denticles.

Paleænonites circumscriptus is more narrow and the anterior is more elongate than other species of the genus.

Occurrence: *P. circumscriptus* was collected from the Rockland at the escarpment about two miles north of Lindsay, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,269.

Paleœnonites accuratus ? Eller

Maxilla II.

Paleœnonites accuratus Eller, 1942, Annals, Carnegie Museum, vol. xxix, p. 252, pl. 2, figs. 17, 18.

P. accuratus ? Eller was found in large numbers in the Meaford formation, Upper Ordovician, at Streetsville, Ontario. It seems to be widely distributed in the Trenton. Specimens were found near Lindsay, Kirkfield and Lakefield in Ontario, and south of Watertown, New York. The Trenton form lacks the narrow ridge that extends from the last denticle across the posterior and along the outer margin. The absence of the surface structure may constitute a specific difference.

Genus EUNICITES, Ehlers, 1868

Eunicites tolmachoffi sp. nov.

Maxilla III or IV, plate VI, figs. 1-7.

The jaw is small, subrectangular in outline and measures from 0.13 mm. to 0.35 mm. in length and from 0.18 mm. to 0.67 mm. in width. A series of three or four large, conical, sharp-pointed denticles extends the full length of the inner margin. The first denticle is slightly larger and the denticles decrease in size gradually to the posterior end. The outer margin of the under side is extended inward to form a heavy, curved, sharp-pointed shank. Probably the shank acted also in the capacity of a denticle. In position it is parallel to the denticles but not in the same plane. A large fossa occupies the upper side of the jaw and extends slightly into the shank. The margins of the fossa are thin and usually broken. The upper side adjacent to the denticles and shank is concave. The under side is convex.

Jaws of this type are common in most faunas but differ widely in individual form. If enough specimens were available perhaps this species might be split into several species. *Eunicites mutabilis* Eller (1934) and *E. divergens* Eller (1938) are similar in a general way to *E. tolmachoffi*.

Occurrence: This species is common in the Trenton and was found from Collingwood, Ontario, to Lowville, New York. The figured specimen comes from Lindsay, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,261; also a paratype, number 25,547. Paratypes have been deposited in the Royal Ontario Museum of Paleontology and at Princeton University.

***Eunicites geisacanthus* sp. nov.**

Maxilla IV or V, plate VI, figs. 8-10.

The jaw consists of a single small, thick, subtriangular denticle which tapers abruptly from a wide base to an acute anterior end. The figured specimen measures 0.43 mm. in length. The jaw is quite angular and two definite ridges are formed at the midpoint and extend to the anterior end. Along these two ridges are a series of minute denticles or hair-like serrations. They are pointed in a forward direction. The upper side of the jaw is occupied by a large fossa. The margins of the fossa are slightly thickened and rounded. The surfaces of the jaw are irregularly concave and convex.

Several species in this fauna have small hair-like spines along a single or double denticle. In outline *E. geisacanthus* is very much like *E. whiteae*. *E. geisacanthus* differs however in its angularity, width of fossa, and the presence of the minute spine-like teeth along the borders.

Occurrence: The figured specimen is from the St. Maurice Quarry north of Three Rivers, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,537.

***Eunicites whiteae* sp. nov.**

Maxilla V ?, plate VI, figs. 11, 12.

The jaw is a single sharp-pointed, subtriangular denticle or fang measuring 0.35 mm. in length and 0.54 mm. in width. A smaller figured specimen measures 0.18 mm. in length and 0.38 mm. in width. The anterior margin is wide and slightly curved while the posterior end is acute. The inner and outer margins are curved. A narrow fossa occupies the complete outer margin.

Eunicites whiteae is very similar to *E. denticulatus* Eller (1942). They differ from each other in the width of the jaw and the shape of the fossa. There is a slight similarity between *Arabellites* (?) *conus* Eller (1938) and *E. whiteae*.

Occurrence: The figured specimens came from the Rockland in the escarpment four miles north of Lindsay, Ontario, and from the Middle Trenton near Three Rivers, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,345; also a paratype, number 25,536.

***Eunicites compressus* sp. nov.**

Maxilla IV or V, plate VI, figs. 13, 14.

The jaw is small, thin, and wedge shaped. The figured specimens measure 0.33 mm. and 0.27 mm. in length and 0.43 mm. and 0.54 mm. in width respectively. The jaw has a single blunt denticle with a very small base. The outer margin is slightly incurved. On the upper side, a wide, shallow fossa occupies the full length of the jaw. The margins of the fossa are thickened and rounded, especially at the posterior part. The upper side of the jaw is convex while the under side is concave or flattened. The concavity of the under side causes the shallowness of the fossa and the compressed appearance of the jaw.

Specimens of this type are often common in a fauna, but usually they seem to be incomplete and the writer has hesitated to describe them. The margins of *Eunicites compressus* appear to be complete; thus a description is offered. *Arabellites* ? *conus* Eller (1938), *E. denticulatus* Eller (1942), and *E. whiteae* are similar to *E. compressus* in a general way.

Occurrence: The figured specimens are from the Rockland at Lakefield, Ontario, and from the Middle Trenton north of Three Rivers, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,380; also a paratype, number 25,533.

***Eunicites barbaricus* sp. nov.**

Maxilla IV or V, plate VI, figs. 15, 16.

The jaw is a single, elongate, angular, cone-like fang which tapers to a sharp-pointed anterior end. The width at the posterior end, which may be broken, is 0.16 mm.; the length is 0.43 mm. The lateral sides are nearly straight to just beyond the mid-area where a slight backward directed curve is present. Extending along each side is a thin, narrow ridge or flange which bears a series of minute, hair-like crenulations or teeth. They extend the full length of the jaw. In a cross section the jaw is flattened and angular, especially at the anterior end. A large fossa occupies the posterior end of the jaw.

Eunicites acis, described in this paper, is also a single denticle or fang with minute thorn-like crenulations. It is, however, much smaller in size and rounder in cross section than *Eunicites barbaricus*.

Occurrence: The figured specimens are from the Rockland at Kirkfield, Ontario, and from the St. Maurice Quarry at Three Rivers, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,432; also a paratype, number 25,605.

***Eunicites toddi* sp. nov.**

Maxilla III or IV, plate VI, fig. 17.

The jaw is subtriangular in outline. Two short, heavy, sharp pointed denticles are present on the inner margin. On the anterior and posterior margins a series of minute serrations are present. A large fossa occupies the length of the jaw. Due to broken margins the true shape of the fossa is not discernible. The upper and under sides of the jaw are irregularly convex.

Like *Eunicites acis*, this form has the hair-like spines on the margins. It will be retained in the genus *Eunicites* for the present. Jaws of this strange type have never been observed among fossil species and to the best of the writer's knowledge they do not occur among recent forms.

Occurrence: *E. toddi* was found in the Rockland and the figured specimen is from near Lindsay, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,232. A paratype has been deposited in the Royal Ontario Museum of Paleontology.

***Eunicites sweadneri* sp. nov.**

Maxilla I, plate VI, figs. 20, 21.

The jaw or forceps is long, thick, angular, and wide posteriorly, and pointed anteriorly. When viewed from the side it may be seen that the jaw is curved at the anterior third nearly in a right angle. Specimens measure from 1.02 mm. to 1.08 mm. in length. A large, round, deep fossa is present in the posterior third of the jaw. The margins of the fossa are slightly thickened and rounded. Most of the jaw is irregularly convex except for the areas adjacent to the fossa.

The side view, fig. 21, probably illustrates the position of the jaw in the annelid. Many recent forms have jaws of this type. This species differs only slightly from other species of *Eunicites*. The shape and position of the fossa is unlike other forms.

Occurrence: *E. sweadneri* was found in the Cobourg at Collingwood and at Cobourg, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,325; and a paratype has been deposited in the Royal Ontario Museum of Paleontology.

Eunicites kirkfieldensis sp. nov.

Maxilla IV, plate VI, fig. 22.

The jaw is sub-oval in outline and the width is more than twice the length. The figured specimen measures 0.83 mm. in width and 0.36 mm. in length. Along the inner margin, and extending part way along the posterior margin, is a series of long, narrow, conical, sharp-pointed denticles. The first one is small and they increase in size to the fourth denticle which is the largest. They then decrease in size to minute thorn-like teeth at the posterior end. A fossa is present on the upper side of the jaw. The margins of the fossa are irregular and broken. The under side of the jaw is convex while the upper side is generally concave especially adjacent to the denticles.

This species does not resemble any other described form very closely. *Eunicites acus*, described in this paper, and *E. mutabilis* Eller (1934), figure 6, bear the same type of long, thin, sharp-pointed denticles.

Occurrence: The figured specimen is from the Rockland at Kirkfield, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,431.

Eunicites twomeyi sp. nov.

Maxilla I ?, plate VI, fig. 23.

The jaw is wide, short, and measures 1.13 mm. in length and 0.54 mm. in width. The posterior end of the jaw is very wide and tapers rapidly to a narrow anterior extremity. The outer margin is nearly straight while the inner margin curves abruptly from the posterior end. The upper surface is flattened while the under surface is convex. A number of irregular elongated nodes are present on the surface. The entire posterior end of the jaw is occupied by a large fossa. The margins of the fossa are thin and usually broken.

This form is not similar to any other species of the genus. The node-like projections have not been noticed before on the jaws of any fossil Polychaeta.

Occurrence: Only a single specimen of this form was found. It is from the Rockland near Lindsay, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,271.

Eunicites acus sp. nov.

Maxilla IV, plate VI, fig. 24.

The jaw is small, subrectangular in outline and measures 0.27 mm. in length and 0.52 mm. in width. A series of six long, conical, narrow, very sharply-pointed denticles extends the full length of the inner margin. The first denticle is small and the others increase in size uniformly to the posterior end. The anterior margin is straight while the posterior margin is irregular. A large irregular fossa extends the full length of the jaw. The margins of the fossa are thin and the under one is usually broken. The upper side is concave while the under side is convex and is about twice the size of the upper.

Eunicites acus is similar to *E. mutabilis* Eller (1934), fig. 6, except for the size and arrangement of the denticles.

Occurrence: At a small quarry on lot 13, concession A, Mara Township near Gamebridge, Ontario County, Ontario, what is probably the Rockland limestone is exposed. The figured specimen comes from this locality.

Type: The holotype is in the Carnegie Museum, number 25,258.

Eunicites colossus sp. nov.

Maxilla IV or V, plate VI, fig. 25.

The jaw consists of a very large plate or shank with a large, conical, sharp-pointed denticle at the anterior end. The denticle is at right angles to the lateral margins. The figured specimen measures 0.99 mm. in length and 0.67 mm. in width. A fossa extends the full length of the jaw and is deep at the anterior end but very shallow posteriorly. The margins of the fossa are wide and thickened. Except for the denticle the underside of the jaw is slightly concave.

Modern polychaete jaws of this type, represented by the fourth or fifth maxilla, are common. If *Eunicites colossus* is a fifth maxilla, then the component jaws of the complete jaw apparatus would probably have to be extremely large in size. Two other species, *E. cavus* and *E. ansatus*, are similar to *E. colossus* either in the shape of the denticle, the position and shape of the fossa, or in the size and shape of the plate or shank. Hinde, 1882, described the species *Arabellites uncinatus* from the Silurian of Gotland in a variety of forms that resemble *Eunicites colossus* very closely.

Occurrence: The figured specimen is from the Middle Trenton at the St. Maurice quarry, north of Three Rivers, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,549.

***Eunicites acis* sp. nov.**

Maxilla V, plate VI, fig. 26.

The jaw is a small, slightly flattened cone. The figured specimen measures 0.13 mm. in length and 0.21 mm. in width. The jaw is wide at the base and tapers rapidly to a sharp-pointed anterior end. Along the sides of the jaw a series of minute, hair-like teeth are present. They are directed forward and extend the full length of the jaw. A wide fossa occupies the complete base of the jaw. The margins of the fossa are rounded and thickened.

Serrations on a denticle or fang have not been observed in fossil polychaete jaws before. The described specimen seems to be complete and unbroken at the fossa. This species is placed in the genus *Eunicites* until further material is available for study.

Occurrence: Just east of Dunsford, Victoria County, Ontario, a shallow limestone, probably Rockford in age, crops out along the highway near the railroad crossing. The figured specimen is from this locality.

Type: The holotype is in the Carnegie Museum, number 25,260.

***Eunicites aculeus* sp. nov.**

Maxilla V?, plate VI, figs. 27, 28.

The jaw is small and rectangular in shape with a single long, thin, slightly curved fang or denticle. The figured specimen measures 0.54 mm. in length. A small, round fossa is present at the base of the fang. The posterior end of the jaw is wide and obliquely truncate. The upper and under surfaces are flattened.

In recent Polychaeta, fangs of this type are common but as fossils they are rather rare. *Eunicites aculeus* is not very similar to any other species.

Occurrence: This species was found in the Denmark member of the Sherman Fall at Trenton Falls, New York.

Type: The holotype is in the Carnegie Museum, number 25,344.

***Eunicites conjectus* sp. nov.**

Maxilla III, plate VI, fig. 29.

The jaw is rectangular in outline and the figured specimen measures 0.62 mm. in length. Along the inner margin a series of four short, blunt

denticles extends the full length of the jaw. The denticles are nearly equal in size and are perpendicular to the length of the jaw. A deep groove between each denticle which extends nearly to the outer margin gives them the impression of being long as well as wide. A large deep fossa occupies the upper side of the jaw. The margins of the fossa are mostly broken.

Jaws of this kind are usually present in collections of scolecodonts. The shortness of the denticles and the extension as a groove of the small spaces in between each denticle, warrant description of this form.

Occurrence: The figured specimen is from the Rockland at Kirkfield, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,558.

***Eunicites planoconvexus* sp. nov.**

Maxilla IV, plate VI, figs. 30, 31.

The jaw is irregular in outline and angular in form. The width of the jaw is 0.4 mm. and the length 0.29 mm. Two long, narrow, sharp-pointed denticles are present on the underside of the jaw. The anterior, posterior, and lateral margins are nearly straight and form angles with each other. A deep fossa occupies the entire upper surface of the jaw. The surfaces formed by the denticles on the under side are concave or flattened.

At first it was thought that jaws of this type were fragments but the completeness of the anterior and posterior margins eliminates that possibility. *E. planoconvexus* resembles other species of this genus only in a general way. Most forms of this type have three or more denticles.

Occurrence: The figured specimen is from the Rockland at Paquette Rapids, Ottawa River, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,604.

***Eunicites plackae* sp. nov.**

Maxilla I or V, plate VI, fig. 32.

The fang or jaw is regularly curved from the anterior to the posterior end. The width of the jaw is narrow and uniform in size. It tapers gently at the anterior to an acute end. The figured specimen measures 0.64 mm. in length. An irregular fossa, parallel to the long axis of the jaw, is present at the posterior end. The margins of the fossa are thickened, slightly flattened, and extended as small flanges at the anterior. On the inner surface there is a small groove which extends to the margin of the fossa between the flanges. In the posterior part of the jaw a slight ribbing effect is discernible.

This form is similar in its general character to several other species. It differs in the shape of the fossa. The presence of the minute ornamentation at the posterior end has not been observed in other forms.

Occurrence: About four miles north of Peterborough, Ontario, near the highway is a small quarry of what is probably Rockland limestone. The figured specimen was found at this quarry.

Type: The holotype is in the Carnegie Museum, number 25,247.

***Eunicites cavus* sp. nov.**

Maxilla V, plate VI, figs. 33, 34.

The jaw is a single denticle or fang extending from an angular base. It measures from 0.35 mm. to 0.81 mm. in length and from 0.38 mm. to 1.08 mm. in width. The anterior and outer margins are nearly straight and are at right angles to each other. The fang is conical, sharp-pointed, and is an inner termination of the anterior margin. A small blunt or sharp-pointed shank is present at the opposite end of the outer margin. Most of the upper surface is occupied by a fossa which extends halfway along the anterior edge of the fang.

This form is common in the fauna but does not resemble very closely any other species. *Arabellites uncinatus* Hinde (1882) is a single denticle with an extended plate slightly similar to *Eunicites cavus*.

Occurrence: The species seems to be limited to the Rockland and is especially common at Kirkfield, Ontario. Several large specimens were found in the Middle Trenton at St. Maurice quarry, north of Three Rivers, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,291; also a paratype, number 25,548. Paratypes are in the collections of the Royal Ontario Museum of Paleontology and Princeton University.

***Eunicites ansatus* sp. nov.**

Maxilla V, plate VI, figs. 35, 36.

The jaw is composed of a single denticle or fang with a wide flattened base or shank. The figured specimen measures 0.54 mm. in width. The fang is conical and very acute, but widens rapidly to the base. A large shallow fossa occupies nearly half of the upper side of the jaw. The margins of the fossa are wide and thickened, especially at the anterior end. A large flattened shank extends posteriorly from the jaw. The upper surface of the jaw is convex except the shank which has a slight crease or concave

area beginning on the right margin and running lengthwise. Except for the fossa the under side is convex.

Eunicites ansatus is similar to *E. cavus* except for the width of the shank and character of the fossa.

Occurrence: The figured specimen is from the Middle Trenton, north of Three Rivers, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,543.

Genus UNGULITES, Stauffer, 1933

***Ungulites longidentatus* sp. nov.**

Maxilla III or IV, plate VII, fig. 1.

The jaw is elongate and large. The figured specimen measures more than 0.78 mm. in length. A large fang and three small denticles are present on the inner margin. The fang measures 0.43 mm. in length. It is thin, conical, and tapers to a needle-like point. The remaining denticles are conical and sharp-pointed, and decrease in size posteriorly. All the denticles are pointed in a direction nearly perpendicular to the margins. A fossa occupies all of the side of the jaw. The margins of the fossa are thin and broken. The under side or area adjacent to the denticles is slightly concave.

Ungulites longidentatus is slightly similar to *U. sumnerae*. The two species differ in the shape and number of the denticles and the surface contours. *U. bicuspidatus* Stauffer (1933) resembles *U. longidentatus* only in a general way.

Occurrence: The figured specimen is from the Rockland, three miles north of Lindsay, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,376.

***Ungulites sumnerae* sp. nov.**

Maxilla III or IV, plate VII, figs. 2, 3.

The jaw is large and cone-shaped in form. Specimens measure from 0.78 mm. to 1.16 mm. in width and from 0.32 mm. to 0.49 mm. in length. The inner margin bears a large fang and two conical denticles. The fang is long, sharp-pointed, and conical or slightly flattened. There is no uniformity of direction in which the denticles or fangs point. A large round or angular fossa occupies the complete side of the jaw. The margins of the fossa are slightly thickened but in most specimens are broken. The upper side of the jaw is convex while the under side is usually flattened.

The orientation of the jaw is questionable but probably the denticles extended slightly forward. There is only a slight similarity between *U. bicuspidatus* Stauffer (1933) and *U. sumnerae*.

Occurrence: This species was found only in the Rockland and the figured specimens are from near Lindsay, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,205; also a paratype, number 25,206. A paratype is in the Royal Ontario Museum of Paleontology.

***Ungulites bifurcus* sp. nov.**

Maxilla III or IV, plate VII, fig. 4.

The jaw is wedge-shaped and measures 0.27 mm. in length and about 0.75 mm. in width. A long, angular, sharp-pointed fang occupies the inner margin. At the base of the fang on the posterior margin, a small, conical, sharp-pointed denticle is present. It appears to be part of the fang. About half of the upper side of the jaw is occupied by a wide, deep fossa. The outer margin of the fossa is broken.

Stauffer (1933) described a species, *U. bicuspidatus* Stauffer that resembles *U. bifurcus* closely except for the length of the jaw and the shape of the denticles.

Occurrence: The figured specimen is from the Rockland at Lakefield, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,379.

***Ungulites confertus* sp. nov.**

Maxilla III, plate VI, figs. 18, 19.

The jaw is twice as wide as it is long. The figured specimen measures about 0.33 mm. in length. A series of five conical, sharp-pointed denticles occupies the inner margin. The first denticle is small and situated at the base of the large second denticle or fang. The two denticles are pressed close together. The remainder of the denticles are small and decrease in size to the posterior end. A large fossa occupies half of the upper side of the jaw. The margins of the fossa are thin. The under and upper surfaces of the jaw are irregularly convex.

Ungulites confertus is similar to *U. sumnerae* and *U. longidentatus* in general shape and in the character of the denticles. The presence of a small denticle anterior to the fang and the shortness of the second denticle or fang are specific differences.

Occurrence: The figured specimen is from St. Maurice Quarry, north of Three Rivers, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,542.

Genus NEREIDAVUS, Grinnell, 1877

Nereidavus avinoffi sp. nov.

Maxilla I, plate VII, figs. 5, 6.

The jaw is elongate, narrow anteriorly, and wide at the middle and the posterior end. In length, the jaws vary from 0.32 mm. to 1.24 mm.; the figured specimen measures 1.05 mm. Along the inner margin, a series of from eighteen to twenty-two sharp-pointed, conical denticles extends to the posterior end. The fang is long, thin, and pointed, and it is out of alignment with other denticles. The next three or more denticles are long and narrow and may be pointed in a forward direction. Following these are some small denticles that gradually became larger to a point at about the posterior third of the jaw. The denticles then decrease in size rapidly to the posterior end. A wide, angular flange with nearly straight sides is present on the inner margin at the posterior third of the jaw. The outer margin is wide and gently rounded. The posterior end is wide and obliquely truncate. A large fossa occupies about one-half the upper surface of the jaw. The margins of the fossa are thickened and well rounded. The upper surface is convex while the lower is flattened and irregularly concave and convex.

The width of the mid-area, the large size of the fossa, and the wide flange are not particularly characteristic of the genus. The species, however, does not fit in any other group very well. If *Nereidavus avinoffi* is compared with *N. procurvus* Eller (1942), certain similar characteristics may be observed. A like resemblance may be also noted in *N. alatus*.

Occurrence: The type specimen is from the Rockland near Lindsay, Ontario. The form occurs commonly throughout the Trenton from Craigleith, Ontario, to Rodman, New York.

Types: The holotype is in the Carnegie Museum, number 25,171. Paratypes have been deposited in Princeton University and in the Royal Ontario Museum of Paleontology.

Nereidavus artatus sp. nov.

Maxilla I, plate VII, figs. 7, 8.

The jaw is long, narrow, and measures 0.51 mm. in length. On the inner margin a series of minute, sharp-pointed denticles, nearly perpen-

dicular to the margin, extends for about two-thirds the length of the jaw. The large, conical, sharp-pointed fang is slightly out of alignment with the denticles. At each end of the series of denticles, there is a suggestion on the margin of additional dentation. The outer margin curves irregularly but, in general, is nearly parallel to the inner margin. The posterior end is rounded and notched. A narrow fossa occupies the posterior third of the jaw. The margins of the fossa are thickened and well rounded. The upper side of the jaw is convex except at the posterior end where there is a concave area adjacent to the fossa. The under side is flattened except for a convex area at the posterior end.

Nereidavus artatus is similar to a number of closely related species extending from the Ordovician to the Upper Devonian. The Silurian form, *N. invisibilis* Eller (1940) resembles it in a general way. *N. harbisonae* Eller (1941) and *N. ontarioensis* Stauffer (1939) from the Middle Devonian have the same general characteristics but differ in details. The Upper Devonian form *N. perlongus* Eller (1934) is similar to *N. artatus* except for the denticles. Zebra (1935) described two species, *Arabellites kettneri* and *A. angustidens*, which are probably related to *Nereidavus artatus*, although the denticles in Zebra's species are not discernible. A third species, *Arabellites perneri* Zebra, fig. 1, may be related to this group and also to the other two beforementioned species described by Zebra. *Cenonites aspersus* Hinde (1880) is another example in which the denticles were not discernible. This form resembles Zebra's specimen and is also similar to *N. artatus*.

Occurrence: The type specimen is from the Denmark, Sherman Fall, Copenhagen, New York.

Type: The holotype is in the Carnegie Museum, number 25,346.

***Nereidavus alatus* sp. nov.**

Maxilla I, plate VII, figs. 9-11.

The jaw is elongate, narrow anteriorly and wide posteriorly. The figured specimen measures 1.70 mm. in length. A series of fourteen sharp, conical denticles extends nearly to the posterior end. The fang is narrow, long, sharp, and slightly hooked. The first three or four denticles are irregular in size and point slightly forward. The next three or four denticles are large. Following these the denticles become gradually smaller. Except for the anterior ones all the denticles are directed backward. The outer and inner margins widen in the posterior third of the jaw and form wide

flanges or wings. The posterior end is wide and truncate. A narrow fossa occupies the posterior third of the jaw. The margins of the fossa are not thickened except at the anterior end. The under side is convex except for a groove in the posterior end.

Nereidavus procurvus Eller (1942) is similar in a general way to *N. alatus*. The denticles of the two forms are quite different. A slight relationship may be noted between *N. perlongus* Eller (1934) and *N. alatus*.

Occurrence: The type specimens are from the Cobourg at Collingwood and the Rockland at Lakefield, Ontario. The species is quite common and was found from Craigleith, Ontario, to Rodman, New York.

Types: The holotype is in the Carnegie Museum, number 25,165, also a paratype, number 25,166; and other paratypes have been deposited in Princeton University and the Royal Ontario Museum of Paleontology.

***Nereidavus angulosus* sp. nov.**

Maxilla I, plate VII, figs. 12-16.

The jaw is long and narrow and measures from 0.59 mm. to 0.78 mm. in length. Along the straight inner margin there is a series of about twenty denticles of three different types. Following a short, heavy, well-hooked fang is a group of ten or eleven sharp, conical denticles which are directed backward. The next five or six denticles are large and blunt. In some specimens these groups of denticles are not well developed. The last six or seven denticles are small and blunt and extend nearly to the end of the jaw. Often part of the denticles, especially in the mid-area, will be oblique to the surface of the jaw. The margins of the jaw are nearly parallel and the outer one is irregularly curved. At the posterior end of the outer margin an angular-shaped bight is present. The posterior end of the jaw is acute. A deep, angular-shaped fossa is present in the posterior half, including the small shank formed by the indentation on the outer margin. The margin of the fossa is thickened and rounded. Both upper and lower sides of the jaw are convex, but often irregularly so.

Jaws of this type have been found from the Ordovician to the Devonian. They are all left jaws. Usually it is not possible to decide which left and right jaws go together when they are not found in an articulated position. Forms of this type are quite distinct from other species of the genus. It is probable that a new genus should be erected to include these species. Forms that are similar to *Nereidavus angulosus* and to each other are as follows: *N. hamus* Eller (1942), *N. invisibilis* Eller (1940), *N. perlongus*

Eller (1934), and *N. harbisonae* Eller (1941). *Nereidavus ontarioensis* Stauffer (1939) and *Ænonites aspersus* Hinde (1882) are similar to *N. angulosus* in a general way. Zebra (1935) described three species, *Arabellites perneri*, *A. kettneri*, and *A. angustidens* that are very similar to each other and which resemble *N. angulosus*. Although the posterior ends are shown but only one side of the species is illustrated, exact comparison cannot be made.

Occurrence: *N. angulosus* is from the Rockland. The figured specimens were found at Lakefield and near Lindsay, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,223, also a paratype, number 25,224.

***Nereidavus procurvus* ? Eller**

Maxilla I.

Nereidavus procurvus Eller, 1942, Annals, Carnegie Museum, vol. xxix, pp. 247, 248, pl. 1, figs. 22, 23.

A large number of specimens, in not too good a state of preservation, were found at various Trenton localities. These may be referred to the form found at Streetsville, Ontario, in the Meaford formation, Upper Ordovician. The Trenton specimens differ in a number of details. The second denticle is not so large, the fang is more hooked, and there are more denticles than in those from the Meaford formation.

MARLENEITES, new genus

The jaw is narrow, sub-oval in outline, and usually short although it may be elongate. A series of denticles extends the full length of the jaw or nearly to the posterior end. The denticles are often quite uniform in size but usually they are larger at the anterior end and decrease in size to the posterior extremity. The anterior end is usually broadly rounded and the posterior end may be blunt or acute. The under side, bearing the denticles, may be straight, arched, or curved. In most forms, the under side is convex but it may be flattened or slightly concave near the edges and at the anterior end. A fossa occupies the complete upper side. The margins of the fossa are thickened and rounded.

Genotype, *Ænonites marginatus* Eller, American Midland Naturalist, vol. 32, p. 700, pl. II, figs. 11-14 (1944).

There is a similarity between the forms included in the genera *Marleneites* and *Staurocephalites*. In *Staurocephalites*, the first denticle seems to be a continuation of the anterior and an inner margin. In both genera, the

fossa occupies the complete upper side but the margin of the fossa of *Marleneites* is thickened and rounded while the margin in *Staurocephalites* is usually thin and broken. Formerly, the writer had placed jaws of this type in the genus *Ænonites* but they do not correspond well with Hinde's description, "Jaws with a more or less curved anterior hook followed by a series of smaller teeth, similar in character to those of the existing genus *Ænone*." The genotype, *Marleneites marginatus* (Eller), *Ænonites excavatus* Eller (1941), and four new species, *Marleneites aureus*, *M. arduus*, *M. farrari* and *M. millerae*, described in this paper, are included in the new genus.

***Marleneites millerae* sp. nov.**

Maxilla II, plate VII, figs. 17-19.

The jaw is elongate, wider at the mid-area and measures 0.38 mm. in length. A series of thirteen, nearly uniform, sharply pointed, conical denticles extends along the curved inner margin to the posterior extremity. At the mid-point, the denticles are slightly larger. The anterior and posterior ends are acute. When the jaw is viewed from the side, the margin bearing the denticles is gently arched. The outer margins are curved and slightly thickened. A large fossa, shallow along one side, extends the complete length of the jaw.

Staurocephalites antiquus Stauffer (1933), fig. 37, resembles *Marleneites millerae* when viewed from the side. Stauffer's specimen has nearly twice as many denticles and the anterior and posterior ends are more truncate.

Occurrence: The figured specimen is from the Rockland, four miles north of Peterborough, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,161.

***Marleneites arduus* sp. nov.**

Maxilla II, plate VII, figs. 20-23.

The jaw is small, not narrow, and tapers gently to rounded ends. Specimens range in length from 0.35 mm. to 0.48 mm. On the convex lower surface a series of eleven or twelve sharp, conical, backward directed denticles extends the full length of the jaw. The denticles are usually quite uniform in size but may be slightly larger at the anterior end or at the mid-area. The inner margins are parallel and slightly rounded. A large, deep fossa occupies the upper side of the jaw. The margin of the fossa is thickened and rounded.

Marleneites arduus is very similar to *M. marginatus* (Eller) in its general characteristics. The two species differ in the shape of the outer margins, the concavity and convexity of the lower side, and the thickness of the margins.

Occurrence: The figured specimens are from the Rockland near Lindsay, and from the Cobourg at Collingwood, Ontario.

Types: The holotype is in the Carnegie Museum, number 25,153; also a paratype, number 25,154.

***Marleneites aureus* sp. nov.**

Maxilla II, plate VII, fig. 25.

The jaw is long and narrow and the figured specimen measures 1.02 mm. in length. On the inner margin, a series of thirteen sharp-pointed, widely conical denticles extends the full length of the jaw. The first six denticles are large and widely spaced. The remaining ones decrease in size rapidly to the posterior end. The anterior margin is rounded. Nearly parallel lateral margins terminate in an obtuse posterior extremity. A large wide fossa occupies the complete upper side of the jaw. The margins of the fossa are slightly thickened and rounded. The under side of the jaw is irregularly concave adjacent to the row of denticles.

M. marginatus (Eller) 1944, is similar to *M. aureus* in general shape. They differ in length, thickness of the margins, and the character and distribution of the denticles. There is a slight resemblance between *M. arduus* and *M. aureus*. The length of the jaw and type of denticles is not the same for the two forms.

Occurrence: The type specimen was found in the Selby member of the Rockland at Lowville, New York.

Type: The holotype is in the Carnegie Museum, number 25,162.

***Marleneites farrari* sp. nov.**

Maxilla II, plate VII, fig. 27.

The jaw is elongate and sub-oval in outline. Both the anterior and posterior margins are broadly rounded. A series of thirteen to fifteen sharp, triangular, backward directed denticles extends to the posterior extremity. The first denticle is smaller than the second and is slightly out of line with the other denticles. From the anterior end the denticles decrease in size until they are minute at the posterior end. The outer margins are gently curved and the jaw may be slightly narrower at the mid-area.

A large deep fossa occupies the complete upper side of the jaw. The margin of the fossa is slightly thickened and rounded. The jaw measures from 0.45 mm. to 0.72 mm. in length.

In a general way *M. farrari* is similar to *M. arduus*. They differ in the shape and size of the denticles, the shape of the anterior and posterior ends, and the curvature of the outer margins. *M. farrari* is similar to *M. marginatus* (Eller) except for the arrangement of the denticles, the shape of the posterior end, and the shape and thickness of the outer margins.

Occurrence: The species was found only in the Rockland at Belleville, Ontario, and at Lowville, New York.

Type: The holotype is in the Carnegie Museum, number 25,197.

MARPHYSAITES, new genus

The mandible consists of two shafts joined or articulated at the anterior end of the inner margin. The shafts of the mandible are elongate, wide anteriorly and taper to a pointed or blunt posterior end. The thickened anterior margin is straight or curved. The shafts may curve outward or be nearly straight. The surface of the mandible is convex or flattened.

Genotype, *Marphysaites aptus* sp. nov.

Mandibles of several recent species of the genus *Marphysa* Savigny resemble those of *Marphysaites* in a general way. A terminal beveled portion present in many recent forms may be missing at the anterior of the shaft of *Marphysaites*.

Marphysaites aptus sp. nov.

Mandible, plate VII, fig. 26.

The mandible is wide anteriorly and the shaft tapers gradually to an acute posterior end. Specimens measure from 0.67 mm. to 1.1 mm. in length. The thickened anterior margin is straight or slightly incurved to the shallow middle angle at the point of attachment of the shafts. The margin of articulation is irregular and the area of possible overlap is convex. The inner margin from the point of attachment curves outward to the posterior end. The outer margin is irregularly curved. The mandible is convex except for a concave area adjacent to the anterior margin and the area of overlap or articulation.

It is possible that a terminal beveled portion attached to the anterior end of the mandible is missing. A form of this type with its nearly straight

anterior margin might be considered a carrier on first examination. Short paired carriers either in recent or fossil forms have not been observed that do not have straight inner margins for articulation. The mandibles of some recent forms may have straight or curved outer margins while the inner margins of the shafts may be curved or joined along straight sides. Eisenack (1939), Tafel C, illustrates carriers with straight inner margins which have a slight resemblance to *Marphysaites aptus*. It may be possible that some of Eisenack's forms are mandibles. The difference between the mandible, *Marphysaites aptus* and carriers may be observed in three articulated specimens described by Hinde (1896), Eller (1934, vol. xxii), and Eller (1934, vol. xxiv).

Occurrence: Mandibles were found in the Upper Cobourg at Collingwood, Ontario, and in the Rockland at Lakefield, Ontario.

Type: The holotype is in the Carnegie Museum, number 25,306.

Genus ORTHOPELTA, Eisenack, 1939

Orthopelta ? femoralis sp. nov.

Carrier (?), plate VII, figs. 28, 29.

The carrier is long, narrow, and rounded. At the anterior end are three knob-like projections that appear to have articulating surfaces. The shaft is long and slightly bent. The posterior end widens slightly. A deep groove is present between two rounded knobs. It also appears to have articulating surfaces. Specimens measure from 1.18 mm. to 1.32 mm.

A number of fragments and specimens of this type were found in the residues but were rejected as something unrelated to polychaetes. However, there is a slight resemblance to some forms figured by Eisenack (1939) and to certain types of carriers of recent annelids. The questionable part of *Orthopelta ? femoralis* is the enlarged posterior extremity. All known recent and fossil carriers taper to a pointed end. Some carriers of modern forms are hooked or joined. It is possible that paired carriers of this type were articulated and evidence is present on the shaft and at the anterior and posterior ends.

Occurrence: The figured specimens are from the Rockland, Paquette Rapids, Ottawa River, Quebec.

Types: The holotype is in the Carnegie Museum, number 25,642, also a paratype, number 25,643.

***Orthopelta ? bifidus* sp. nov.**

Carrier (?); plate VII, fig. 30.

The paired carriers are elongate, narrow, and angular. The figured specimen is 0.78 mm. in length. Along the center of the shaft is a groove or crack that is considered to be the articulating edge between two carriers. At the anterior end the carriers separate and form a notch between each other. A small indentation is present at the anterior end of each carrier. The posterior end is also notched but the ends of the carrier may be broken. The surface of the carrier is quite irregular and may be crushed.

Orthopelta ? bifidus appears more likely to be a carrier than *O. ? femoralis*. A form, *O. muronata* Eisenack (1939), figure 10, resembles *O. ? bifidus* slightly at the anterior end but differs posteriorly. Carriers of modern polychaetes are usually articulated only for a short distance at the anterior part.

Occurrence: The figured specimen is from the Rockland at Paquette Rapids, Ottawa River, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,644.

Genus SILUROPelta, Eisenack, 1939***Siluropelta calcaratus* sp. nov.**

Mandible, plate VII, fig. 31.

The mandible consists of a plate with an articulation edge along one side. A long, thin, lateral spine or spur is present at the anterior end of the outer margin. The anterior margin is rounded and then incurved to a small protuberance at the point of articulation. The outer margin is straight while the posterior margin and the margin of articulation is broken. The surfaces of the mandible are irregular and it was not determined which was the upper or lower side. Both the mandible and the lateral spine measure 0.45 mm. in length. The total width of the left and right plates would also be 0.45 mm.

Only one side or plate of the mandible is available for description. Eisenack (1939) described a number of mandibles from the Silurian of the Baltic that are of the same general nature. None, however, is similar enough to make an exact comparison. Most mandibles of modern polychaetes do not possess spines of the length of *Siluropelta calcaratus*. One

species, *Paramarphysa obtusa* Verrill, does have long spines but on mandibles of a different character.

Occurrence: The figured specimen is from the St. Maurice quarry, north of Three Rivers, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,555.

Genus DIOPATRAITES, Eller, 1938

Diopatraites tricuspis sp. nov.

Mandible, plate VII, figs. 32, 33.

The mandible is long, narrow, and triangular in cross section. The figured specimen measures 0.99 mm. in length. The frontal plate is small and curved in outline. Three conical sharp-pointed teeth or denticles are present at the anterior end of the frontal plate. The remainder of the anterior edge of the frontal plate is slightly curved and extends as far forward as the denticles. The shaft is curved and tapers to a pointed posterior. The sides of the shaft are concave.

Diopatraites tricuspis is similar to *D. conformis* Eller except for the width of the frontal plate and the shape of the shaft.

Occurrence: The figured specimen is from the St. Maurice quarry, north of Three Rivers, Quebec.

Type: The holotype is in the Carnegie Museum, number 25,556.

Diopatraites fustis ? Eller

Mandible

Diopatraites fustis Eller, 1942, Annals, Carnegie Museum, vol. 29, p. 250, pl. 3, figs. 24-27.

Mandibles are not common in the Trenton beds and only a few fragments were found. One rather complete specimen was obtained from the Rockland at Paquette Rapids, Ottawa River, Quebec. The posterior end is missing but it probably measured 1.65 mm. in length. *Diopatraites fustis* Eller from the Erindale, Upper Ordovician at Streetsville, Ontario, is so similar to the specimen from Paquette Rapids that it does not seem plausible to draw a specific difference. The Paquette Rapids specimen has a heavier and flatter shaft and a more irregular concave area adjacent to the frontal plate than do those from Streetsville.

Diopatraites sp. indet.

Mandible

A broken specimen of a *Diopatraites* from the Hull, Philemon Island, Ottawa River at Hull, Quebec, seems worth mentioning. Since about half of the frontal plate is missing, a specific identification will not be attempted. The mandible is small, probably not more than 1 mm. in length. The frontal plate is narrow and set at about a forty-five degree angle with the shaft. The posterior end of the plate extends a short distance beyond the end of the shaft but not as far as in *Diopatraites fustis* Eller (1942). The shaft is wide and flattened and similar to *Diopatraites conformis* Eller (1938). Most characters would suggest that the mandible is closely related to *Diopatraites fustis* Eller from the Erindale, Upper Ordovician at Streetsville, Ontario.

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EXPLANATION OF PLATE I

Figures magnified about 28 times.

Numbers in parentheses indicate the Carnegie Museum catalogue numbers of the respective type specimens.

FIGS. 1-3.

Lumbriconereites linki sp. nov.
Maxilla I, left jaw (25,285)
Upper, under and lateral sides.
Lakefield, Ontario.

FIGS. 4-6.

L. concertatorius sp. nov.
Maxilla I, left jaw (25,308).
Lateral, under and upper sides.
Collingwood, Ontario.

FIGS. 7, 8.

L. curvus sp. nov.
Maxilla I, right jaw (25,362).
Under and upper sides.
Gamebridge, Ontario.

FIGS. 9-11.

L. projectus sp. nov.
Maxilla I, left jaw (25,273).
Under, upper and lateral sides.
Lindsay, Ontario.

FIGS. 12, 13.

L. crassus sp. nov.
Maxilla I, left jaw (25,304).
Upper and under sides.
Lakefield, Ontario.

FIGS. 14, 15.

L. langae sp. nov.
Maxilla I, left jaw (25,188).
Upper and under sides.
Collingwood, Ontario.

FIGS. 16-18.

L. jenningsi sp. nov.
Maxilla I, right jaw (25,259).
Upper, under and lateral sides.
Kirkfield, Ontario.

FIGS. 19-21.

Lumbriconereites irregularis sp. nov.
Maxilla I, left jaw (25,200).
Lateral, under and upper sides.
Napancee, Ontario.

FIGS. 22-24.

L. macmillani sp. nov.
Maxilla I, right jaw (25,211).
Upper, lateral and under sides.
Copenhagen, New York.

FIGS. 25, 26.

L. johnsoni sp. nov.
Maxilla I, left jaw (25,237).
Upper and under sides.
Lindsay, Ontario.

FIGS. 27, 28.

L. triquetrus sp. nov.
Maxilla I, left jaw (25,361).
Under and upper sides.
Gamebridge, Ontario.

FIGS. 29, 30.

L. bicornis sp. nov.
Maxilla I, right jaw (25,359).
Upper and under sides.
Watertown, New York.

FIGS. 31-33.

L. longae sp. nov.
Maxilla I, left jaw (25,341).
Under, lateral and upper sides.
Collingwood, Ontario.

FIGS. 34-36.

L. tuberosus sp. nov.
Maxilla I, right jaw (25,191).
Lateral, under and upper sides.
Lindsay, Ontario.



EXPLANATION OF PLATE II

Figures magnified about 28 times.

Numbers in parentheses indicate the Carnegie Museum catalogue numbers of the respective type specimens.

FIGS. 1, 2.

Lumbriconereites kosinskii sp. nov.
Maxilla I, left jaw (25,320).
Upper and lateral sides.
Collingwood, Ontario.

FIGS. 17, 18.

Lumbriconereites assimilis sp. nov.,
Maxilla I, right jaw (25,219).
Lateral and under sides.
Peterborough, Ontario.

FIGS. 3, 4.

L. dissimilis sp. nov.
Maxilla I, right jaw (25,453).
Under and lateral sides.
Three Rivers, Quebec.

FIG. 19.

L. assimilis sp. nov.
Maxilla I, left jaw.
Lateral side.
Lindsay, Ontario.

FIGS. 5, 6.

L. dissimilis sp. nov.
Maxilla I, right jaw (25,454).
Under and lateral sides.
Three Rivers, Quebec.

FIG. 20.

L. assimilis sp. nov.
Maxilla I, right jaw (25,215).
Lateral side.
Lindsay, Ontario.

FIGS. 7, 8.

L. angustifossus sp. nov.
Maxilla I, right jaw (25,433).
Under and lateral sides.
Craigleith, Ontario.

FIG. 21.

L. assimilis sp. nov.
Maxilla I, right jaw (25,217).
Under side.
Lindsay, Ontario.

FIGS. 9, 10.

L. ? okulitchi sp. nov.
Maxilla I, right jaw (25,455).
Lateral and under sides.
Three Rivers, Quebec.

FIGS. 22, 23.

Arabellites rectidens ? Eller
Maxilla I, right jaw (25,328).
Under and upper side.
Henderson, New York.

FIGS. 11-13.

L. assimilis sp. nov.
Maxilla I, right jaw (25,221).
Lateral, under and upper sides.
Dunsford, Ontario.

FIGS. 24, 25.

A. rectidens ? Eller
Maxilla I, right jaw (25,327).
Under and under sides.
Port Hope, Ontario.

FIGS. 14-16.

L. assimilis sp. nov.
Maxilla I, left jaw (25,213).
Lateral, upper and under sides.
Kirkfield, Ontario.

FIGS. 26, 27.

A. ? claytonae sp. nov.
Maxilla I, right jaw (25,303).
Upper and under sides.
Lakefield, Ontario.

Plate II; explanation continued from previous page.

FIGS. 28, 29.

Arabellites ? doulti sp. nov.
Maxilla I, right jaw (25,289).
Under and upper sides.
Dalrymple, Ontario.

FIGS. 30, 31.

Ildraites camurus sp. nov.
Maxilla I, left jaw (25,182).
Under and upper sides.
Belleville, Ontario.

FIGS. 32, 33.

I. camurus sp. nov.
Maxilla I, left jaw (25,181).
Upper and under sides.
Collingwood, Ontario.

FIGS. 34, 35.

I. camurus sp. nov.
Maxilla I, left jaw (25,183).
Under and upper sides.
Lowville, New York.

FIGS. 36, 37.

Ildraites camurus sp. nov.
Maxilla I, left jaw (25,184).
Under and upper sides.
Lowville, New York.

FIGS. 38-40.

I. fuehreri sp. nov.
Maxilla I, left jaw (25,225).
Upper, under and lateral sides.
Lindsay, Ontario.

FIGS. 41-43.

I. rarus sp. nov.
Maxilla I, left jaw (25,243).
Upper, lateral and under sides.
Lindsay, Ontario.



EXPLANATION OF PLATE III

Figures magnified about 28 times.

Numbers in parentheses indicate the Carnegie Museum catalogue numbers of the respective type specimens.

FIGS. 1, 2.

Leodicites brooksi sp. nov.
Maxilla II, right jaw (25,249).
Lateral side.
Lakefield, Ontario.

FIGS. 17, 18.

L. collatatus sp. nov.
Maxilla II, right jaw (25,630).
Under and upper sides.
Paquette Rapids, Quebec.

FIGS. 3, 4.

L. brooksi sp. nov.
Maxilla II, right jaw (25,250).
Lateral side.
Lakefield, Ontario.

FIGS. 19, 20.

L. exilis sp. nov.
Maxilla II, right jaw (25,363).
Lateral sides.
Collingwood, Ontario.

FIGS. 5-8.

L. biformis sp. nov.
Maxilla II, right jaw (25,331)
Under, lateral, upper and lateral
sides.
Lindsay, Ontario.

FIGS. 21, 22.

L. arquatus sp. nov.
Maxilla II, right jaw (25,240).
Lateral sides.
Lindsay, Ontario.

FIGS. 9, 10.

L. artus sp. nov.
Maxilla II, right jaw (25,295).
Lateral side.
Gamebridge, Ontario.

FIGS. 23, 24.

L. agostini sp. nov.
Maxilla II, left jaw (25,248).
Lateral sides.
Lakefield, Ontario.

FIGS. 11, 12.

L. semiquadratus sp. nov.
Maxilla II, right jaw (25,251).
Lateral sides.
Lakefield, Ontario.

FIGS. 25, 26.

L. anticus sp. nov.
Maxilla II, right jaw (25,270).
Lateral sides.
Gamebridge, Ontario.

FIGS. 13, 14.

L. antefixus sp. nov.
Maxilla II, right jaw (25,436).
Lateral and upper sides.
Kirkfield, Ontario.

FIGS. 27-29.

L. absolutus sp. nov.
Maxilla II, left jaw (25,245).
Upper and under sides.
Lowville, New York.

FIGS. 15, 16.

L. ? continuus sp. nov.
Maxilla II, left jaw (25,357).
Lateral sides.
Belleville, Ontario.

FIGS. 30-32.

L. angustisulcus sp. nov.
Maxilla II, right jaw (25,518).
Under, upper and lateral sides.
Three Rivers, Quebec.

Plate III; explanation continued from previous page.

FIGS. 33-35.

Leodicites breviculus sp. nov.
Maxilla II, right jaw (25,231).
Lateral, upper and under sides.
Collingwood, Ontario.

FIGS. 36, 37.

L. breviculus sp. nov.
Maxilla II, right jaw (25,228).
Lateral and under sides.
Lindsay, Ontario.

FIGS. 38-40.

L. clementi sp. nov.
Maxilla II, right jaw (25,297).
Under, lateral and upper sides.
Lakefield, Ontario.

FIGS. 41-43.

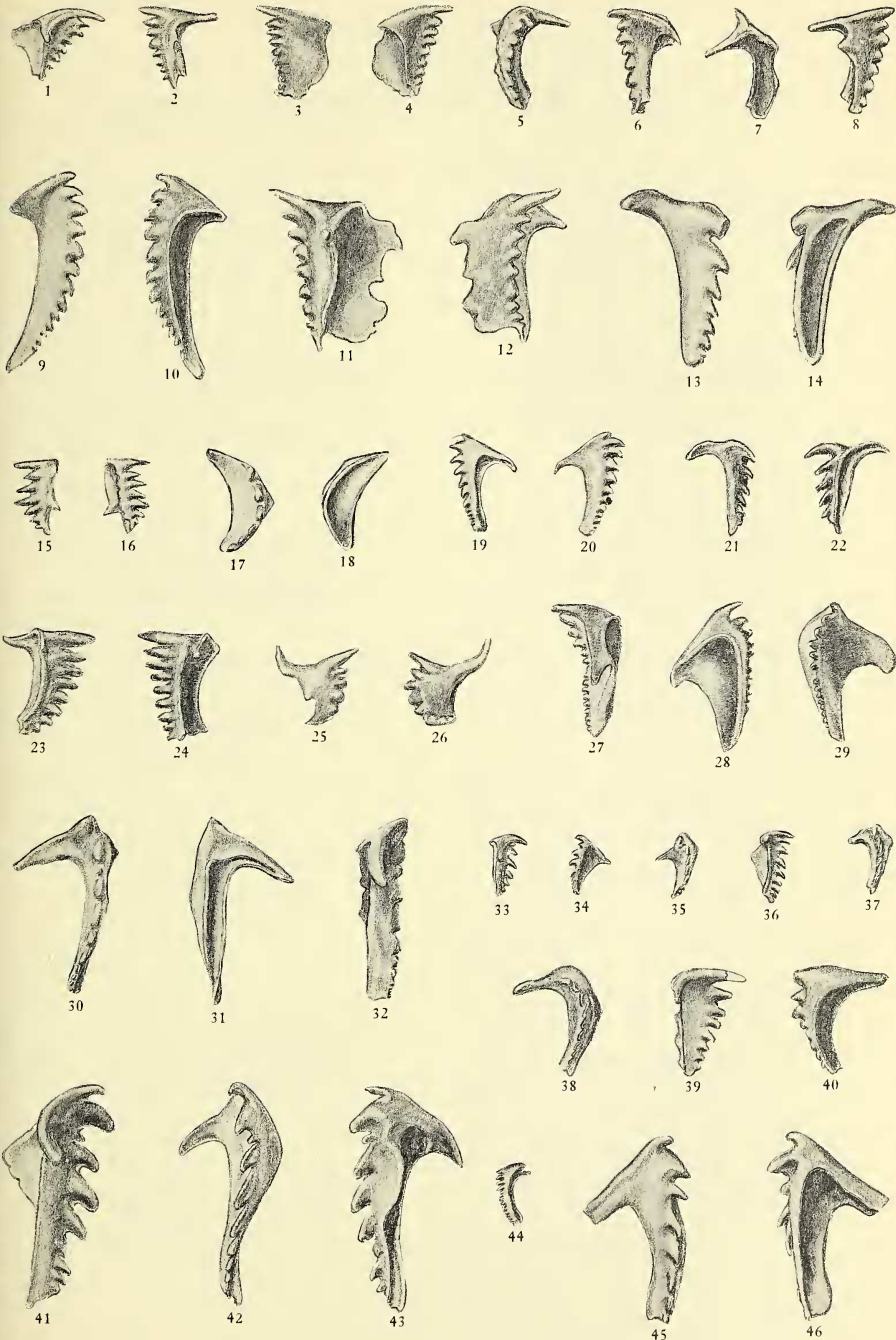
Leodicites buris sp. nov.
Maxilla II, right jaw (25,321).
Lateral, under and upper sides.
Collingwood, Ontario.

FIG. 44.

L. bisulcus sp. nov.
Maxilla II, right jaw (25,356).
Lateral sides.
Collingwood, Ontario.

FIGS. 45, 46.

L. angulus sp. nov.
Maxilla II, right jaw (25,343).
Under and upper sides.
Collingwood, Ontario.



EXPLANATION OF PLATE IV

Figures magnified about 28 times.

Numbers in parentheses indicate the Carnegie Museum catalogue numbers of the respective type specimens.

FIGS. 1, 2.

Leodicites convallis sp. nov.
Maxilla III, left jaw (25,373).
Upper and under sides.
Lindsay, Ontario.

FIG. 3.

L. convallis sp. nov.
Maxilla III, left jaw (25,517).
Lateral side.
Three Rivers, Quebec.

FIGS. 4, 5.

L. corbis sp. nov.
Maxilla III, left jaw (25,631).
Upper and under sides.
Paquette Rapids, Quebec.

FIGS. 6, 7.

Staurocephalites appositus sp. nov.
Maxilla II, left jaw (25,428).
Under and upper sides.
Kirkfield, Ontario.

FIGS. 8, 9.

S. appositus sp. nov.
Maxilla II, right jaw (25,489).
Upper and lateral sides.
Three Rivers, Quebec.

FIGS. 10, 11.

S. kayi sp. nov.
Maxilla II, left jaw (25,151).
Upper and under sides.
Peterborough, Ontario.

FIGS. 12, 13.

S. aduncus sp. nov.
Maxilla II, right jaw (25,267).
Upper and under sides.
Millington, Ontario.

FIG. 14.

Staurocephalites arcus sp. nov.
Maxilla III, left jaw (25,540).
Lateral side.
Three Rivers, Quebec.

FIG. 15.

S. ? arcus sp. nov.
Maxilla III, left jaw (25,293).
Lateral side.
Collingwood, Ontario.

FIG. 16.

S. admirabilis sp. nov.
Maxilla II, left jaw (25,323).
Upper side.
Collingwood, Ontario.

FIGS. 17, 18.

S. admirabilis sp. nov.
Maxilla II, left jaw (25,324).
Under and upper sides.
Collingwood, Ontario.

FIGS. 19, 20.

S. ? absimilis sp. nov.
Maxilla II or III, right jaw
(25,354).
Lateral and under sides.
Lakefield, Ontario.

FIGS. 21-23.

S. bijugus sp. nov.
Maxilla II, right or left jaw
(25,500).
Lateral and under sides.
Three Rivers, Quebec.

FIG. 24.

S. cuneiformis sp. nov.
Maxilla III, right jaw (25,355).
Under side.
Lowville, New York.

Plate IV; explanation continued from previous page.

FIG. 25.

Staurocephalites absis sp. nov.
Maxilla III, left jaw (25,164).
Lateral side.
Collingwood, Ontario.

FIGS. 26-28.

S. ? triplus sp. nov.
Maxilla II, right jaw (25,212).
Under, lateral and upper sides.
Belleville, Ontario.

FIGS. 29, 30.

S. agriodos sp. nov.
Maxilla III, right jaw (25,353).
Upper and under sides.
Kirkfield, Ontario.

FIG. 31.

S. nettingi sp. nov.
Maxilla II, left jaw (25,309).
Under side.
Lakefield, Ontario.

FIGS. 32, 33.

Staurocephalites mierowae sp. nov.
Maxilla II, left jaw (25,199).
Under and lateral sides.
Lakefield, Ontario.

FIGS. 34, 35.

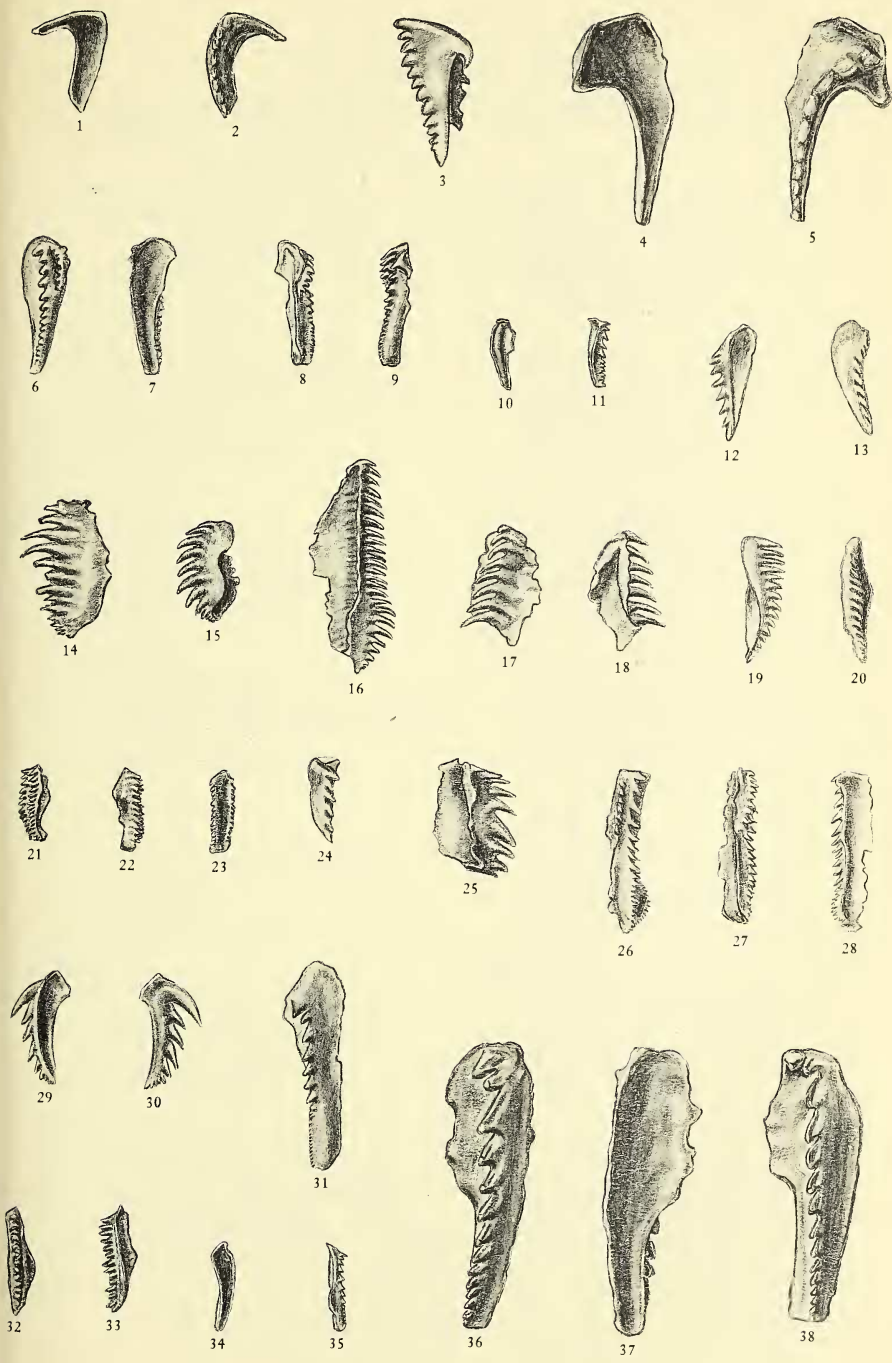
S. heppenstallae sp. nov.
Maxilla II, right jaw (25,145).
Upper and lateral sides.
Hull, Quebec.

FIG. 36.

S. paquettensis sp. nov.
Maxilla II, left jaw (25,637).
Under side.
Paquette Rapids, Quebec.

FIGS. 37, 38.

S. paquettensis sp. nov.
Maxilla II, left jaw (25,636).
Upper and under sides.
Paquette Rapids, Quebec.



EXPLANATION OF PLATE V

Figures magnified about 28 times.

Numbers in parentheses indicate the Carnegie Museum catalogue numbers of the respective type specimens.

FIG. 1.

Enoniles adversus sp. nov.
Maxilla II, left jaw (25,372).
Under side.
Collingwood, Ontario.

FIGS. 12, 13.

Enoniles imparientatus sp. nov.
Maxilla II, (25,365).
Upper and under sides.
Port Hope, Ontario.

FIG. 2.

Æ. ? intrinsecus sp. nov.
Maxilla II, left jaw (25,358).
Lateral side.
Dalrymple, Ontario.

FIG. 14.

Æ. bidwelli sp. nov.
Maxilla I, right jaw (25,301).
Upper side.
Kirkfield, Ontario.

FIGS. 3, 4.

Æ. fissilis sp. nov.
Maxilla I, right jaw (25,282).
Upper and under sides.
Kirkfield, Ontario.

FIGS. 15, 16.

Paleænoniles acutus sp. nov.
Maxilla II, left jaw (25,201).
Upper and under sides.
Lindsay, Ontario.

FIGS. 5, 6.

Æ. ? dubius sp. nov.
Maxilla II or III, left jaw (25,375).
Upper and under sides.
Kirkfield, Ontario.

FIGS. 17, 18.

P. dillae sp. nov.
Maxilla II, left jaw (25,333).
Under and upper sides.
Cobourg, Ontario.

FIG. 7.

Æ. bittingsae sp. nov.
Maxilla I, right jaw (25,268).
Upper side.
Millington, Ontario.

FIGS. 19, 20.

P. dillae sp. nov.
Maxilla II, left jaw (25,335).
Under and upper sides.
Port Hope, Ontario.

FIGS. 8, 9.

Æ. coggeshalli sp. nov.
Maxilla II, left jaw (25,208).
Upper and lateral sides.
Lindsay, Ontario.

FIGS. 21, 22.

P. castigatus sp. nov.
Maxilla II, left jaw (25,234).
Upper and under sides.
Lindsay, Ontario.

FIGS. 10, 11.

Æ. coggeshalli sp. nov.
Maxilla II, right jaw (25,209).
Upper and under sides.
Collingwood, Ontario.

FIGS. 23, 24.

P. castigatus sp. nov.
Maxilla II, left jaw (25,235).
Upper and under sides.
Dexter, New York.

Plate V; explanation continued from previous page.

FIGS. 25, 26.

Paleænonites henryi sp. nov.
Maxilla II, left jaw (25,143).
Upper and under sides.
Lindsay, Ontario.

FIGS. 27, 28.

P. pennatus sp. nov.
Maxilla II, left jaw (25,272).
Upper and under sides.
Lindsay, Ontario.

FIG. 29.

P. clinatus sp. nov.
Maxilla II, left jaw (25,463).
Upper side.
Three Rivers, Quebec.

FIG. 30.

P. clinatus sp. nov.
Maxilla II, left jaw (25,464).
Upper side.
Three Rivers, Quebec.

FIGS. 31, 32.

P. clinatus sp. nov.
Maxilla II, right jaw (25,414).
Upper and under sides.
Kirkfield, Ontario.

FIGS. 33, 34.

Paleænonites frickei sp. nov.
Maxilla II, left jaw (25,266).
Under and upper sides.
Collingwood, Ontario.

FIGS. 35, 36.

P. comptus sp. nov.
Maxilla II, left jaw (25,176).
Under and upper sides.
Collingwood, Ontario.

FIGS. 37, 38.

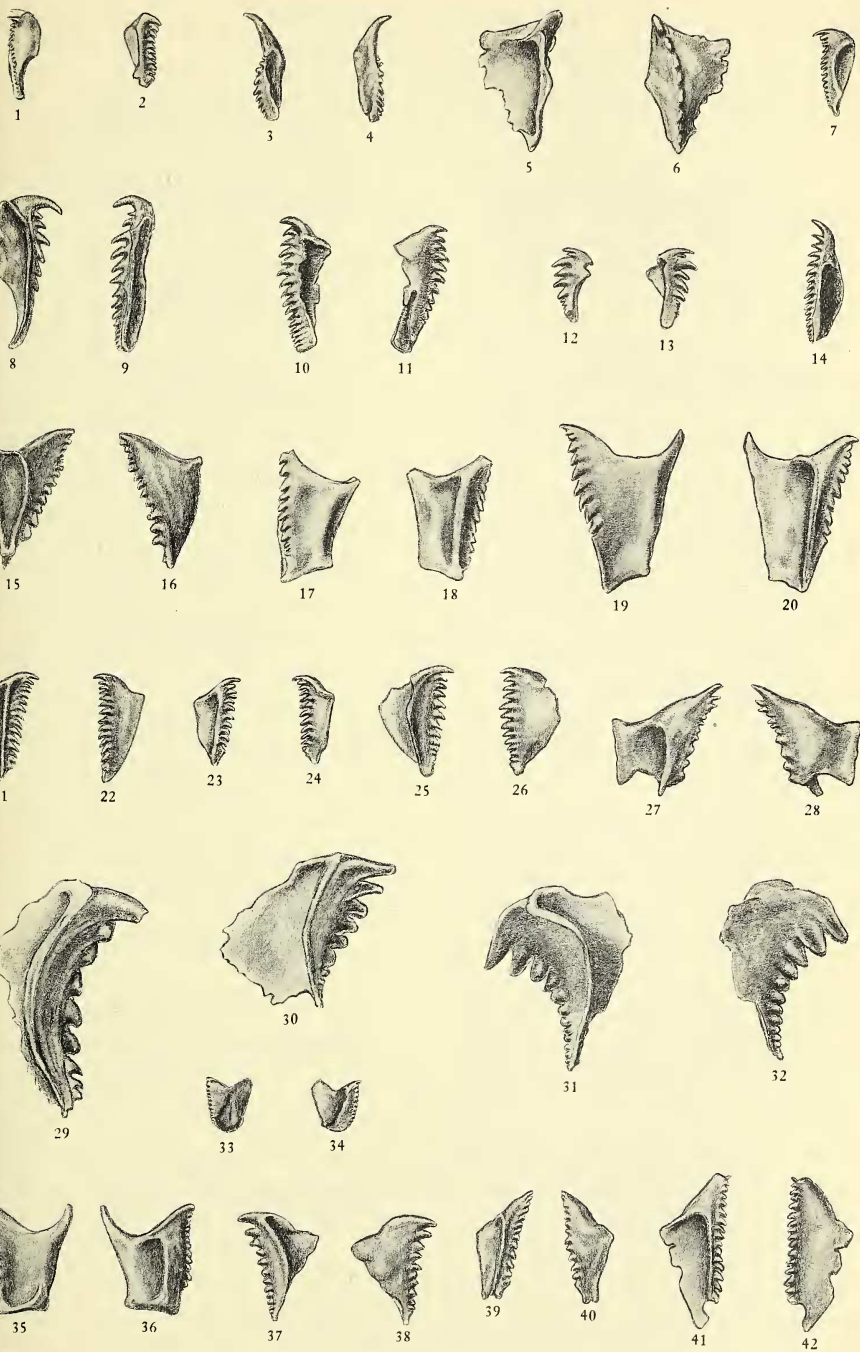
P. davisae sp. nov.
Maxilla II, right jaw (25,246).
Upper and under sides.
Lindsay, Ontario.

FIGS. 39, 40.

P. circumscriptus sp. nov.
Maxilla II, left jaw (25,269).
Upper and under sides.
Lindsay, Ontario.

FIGS. 41, 42

P. circumscriptus sp. nov.
Maxilla II, left jaw (25,350).
Upper and under sides.
Peterborough, Ontario.



EXPLANATION OF PLATE VI

Figures magnified about 28 times.

Numbers in parentheses indicate the Carnegie Museum catalogue numbers of the respective type specimens.

FIGS. 1-3.

Eunicites tolmachoffi sp. nov.
Maxilla III or IV, right jaw
(25,547).
Under, upper and lateral sides.
Three Rivers, Quebec.

FIG. 4.

E. tolmachoffi sp. nov.
Maxilla III or IV, right jaw
(25,545).
Lateral side.
Three Rivers, Quebec.

FIGS. 5, 6.

E. tolmachoffi sp. nov.
Maxilla III or IV, right jaw
(25,265).
Under and upper side.
Cobourg, Ontario.

FIG. 7.

E. tolmachoffi sp. nov.
Maxilla III or IV, left jaw (25,261).
Lateral side.
Lindsay, Ontario.

FIGS. 8-10.

E. geisacanthus sp. nov.
Maxilla IV or V, right jaw (25,537).
Upper and lateral sides.
Three Rivers, Quebec.

FIG. 11.

E. whiteae sp. nov.
Maxilla V ?, left jaw (25,345).
Lateral side.
Lindsay, Ontario.

FIG. 12.

E. whiteae sp. nov.
Maxilla V ?, left jaw (25,536).
Lateral side.
Three Rivers, Quebec.

FIG. 13.

Eunicites compressus sp. nov.
Maxilla IV or V, left jaw (25,553).
Upper side.
Three Rivers, Quebec.

FIG. 14.

E. compressus sp. nov.
Maxilla IV or V, right jaw (25,380).
Upper side.
Lakefield, Ontario.

FIG. 15.

E. barbaricus sp. nov.
Maxilla IV or V, left jaw (25,432).
Upper side.
Kirkfield, Ontario.

FIG. 16.

E. barbaricus sp. nov.
Maxilla IV or V, left jaw (25,605).
Upper side.
Three Rivers, Quebec.

FIG. 17.

E. toddi sp. nov.
Maxilla III or IV, right jaw
(25,232).
Upper side.
Lindsay, Ontario.

FIGS. 18, 19.

Ungulites confertus sp. nov.
Maxilla III, right jaw (25,542).
Under and upper sides.
Three Rivers, Quebec.

FIGS. 20, 21.

Eunicites sweadneri sp. nov.
Maxilla I, left jaw (25,325).
Under and lateral sides.
Collingwood, Ontario.

Plate VI; explanation continued from previous page.

FIG. 22.

Eunicites kirkfieldensis sp. nov.
Maxilla IV, right jaw (25,431).
Under side.
Kirkfield, Ontario.

FIG. 23.

E. twomeyi sp. nov.
Maxilla ?, left jaw (25,271).
Upper side.
Lindsay, Ontario.

FIG. 24.

E. acis sp. nov.
Maxilla IV, right jaw (25,258).
Upper side.
Gamebridge, Ontario.

FIG. 25.

E. colossus sp. nov.
Maxilla IV or V, left jaw (25,549).
Upper side.
Three Rivers, Quebec.

FIG. 26.

E. acis sp. nov.
Maxilla V, left jaw (25,260).
Upper side.
Dunsford, Ontario.

FIGS. 27, 28.

E. aculeus sp. nov.
Maxilla V ?, left jaw (25,344).
Upper and under sides.
Trenton Falls, New York.

FIG. 29.

Eunicites conjectus sp. nov.
Maxilla III, right jaw (25,558).
Lateral side.
Kirkfield, Ontario.

FIGS. 30, 31.

E. planoconvexus sp. nov.
Maxilla IV, left jaw (25,604).
Under and upper sides.
Paquette Rapids, Quebec.

FIG. 32.

E. plackae sp. nov.
Maxilla I or V, left jaw (25,247).
Lateral side.
Peterborough, Ontario.

FIG. 33.

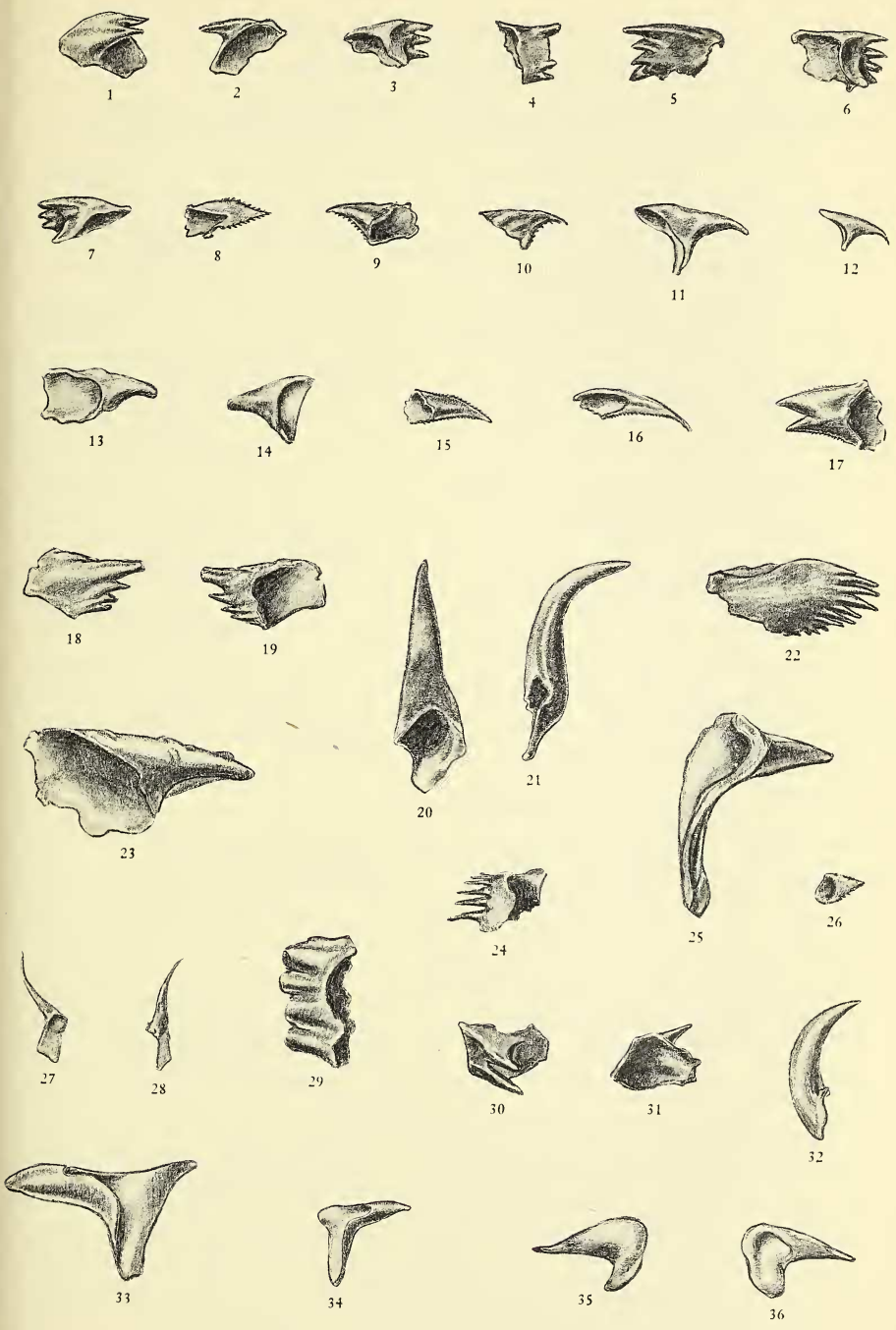
E. cavus sp. nov.
Maxilla V, right jaw (25,548).
Upper side.
Three Rivers, Quebec.

FIG. 34.

E. cavus sp. nov.
Maxilla V, left jaw (25,291).
Upper side.
Kirkfield, Ontario.

FIGS. 35, 36.

E. ansatus sp. nov.
Maxilla V, left jaw (25,543).
Under and upper sides.
Three Rivers, Quebec.



EXPLANATION OF PLATE VII

Figures magnified about 28 times.

Numbers in parentheses indicate the Carnegie Museum catalogue numbers of the respective type specimens.

FIG. 1.

Ungulites longidentatus sp. nov.
Maxilla III or IV, left jaw (25,376).
Lateral side.
Lindsay, Ontario.

FIG. 2.

U. sumnerae sp. nov.
Maxilla III or IV, right jaw
(25,205).
Upper side.
Lindsay, Ontario.

FIG. 3.

U. sumnerae sp. nov.
Maxilla III or IV, right jaw
(25,206).
Upper side.
Lindsay, Ontario.

FIG. 4.

U. bifurcus sp. nov.
Maxilla III or IV, left jaw (25,379).
Upper side.
Lakefield, Ontario.

FIGS. 5, 6.

Nereidavus avinoffi sp. nov.
Maxilla I, right jaw (25,171).
Under and lateral sides.
Lindsay, Ontario.

FIGS. 7, 8.

N. artatus sp. nov.
Maxilla I, right jaw (25,346).
Upper and lateral sides.
Copenhagen, New York.

FIG. 9.

N. alatus sp. nov.
Maxilla I, right jaw (25,165).
Upper side.
Lakefield, Ontario.

FIGS. 10, 11.

Nereidavus alatus sp. nov.
Maxilla I, right jaw (25,166).
Lateral and under sides.
Collingwood, Ontario.

FIGS. 12-14.

N. angulosus sp. nov.
Maxilla I, left jaw (25,224).
Upper, lateral and under sides.
Lindsay, Ontario.

FIGS. 15, 16.

N. angulosus sp. nov.
Maxilla I, left jaw (25,223).
Upper and under sides.
Lakefield, Ontario.

FIGS. 17-19.

Marleneites millerae sp. nov.
Maxilla II, left jaw (25,161).
Under, lateral and upper sides.
Peterborough, Ontario.

FIGS. 20, 21.

M. arduus sp. nov.
Maxilla II, right jaw (25,153).
Under and upper sides.
Lindsay, Ontario.

FIGS. 22, 23.

M. arduus sp. nov.
Maxilla II, right jaw (25,154).
Under and upper sides.
Collingwood, Ontario.

FIG. 24.

Staurocephalites mccallae sp. nov.
Maxilla II, right jaw (25,155).
Lateral side.
Lindsay, Ontario.

Plate VII; explanation continued from previous page.

FIG. 25.

Marleneites aureus sp. nov.
Maxilla II, right jaw (25,162).
Upper side.
Lowville, New York.

FIG. 26.

Marphysailes aptus sp. nov.
Mandible (25,306).
Collingwood, Ontario.

FIG. 27.

Marleneites farrari sp. nov.
Maxilla II, right jaw (25,197).
Lateral side.
Lowville, New York.

FIG. 28.

Orthopelta ? *femuralis* sp. nov.
Carrier ? (25,643).
Paquette Rapids, Quebec.

FIG. 29.

Orthopelta femuralis sp. nov.
Carrier ? (25,642).
Paquette Rapids, Quebec.

FIG. 30.

O. ? *bifidus* sp. nov.
Carrier ? (25,644).
Paquette Rapids, Quebec.

FIG. 31.

Siluropelta calcaratus sp. nov.
Mandible (25,555).
Three Rivers, Quebec.

FIGS. 32, 33.

Diopatraites tricuspis sp. nov.
Mandible (25,556).
Three Rivers, Quebec.

